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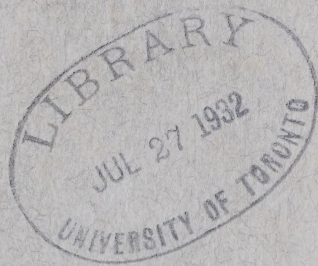
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CANADA—DEPARTMENT OF TRADE AND COMMERCE
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT
ON THE
MINERAL PRODUCTION OF
CANADA
DURING THE CALENDAR YEAR

1930

Published by Authority of the Hon. H. H. Stevens, M.P.,
Minister of Trade and Commerce



OTTAWA
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1932

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LIST OF PUBLICATIONS

PREPARED IN THE

MINING, METALLURGICAL AND CHEMICAL BRANCH
DOMINION BUREAU OF STATISTICS

MINERAL PRODUCTION (Mining and Metallurgy).

General Reports—

Preliminary Reports (semi-annual) on the Mineral Production of Canada.

Monthly Reports on Canada's Leading Mineral Products.

Annual Report on the Mineral Production of Canada. (In one volume).

A comprehensive record of the mining industry embodying historical and world data, detailed information on mineral production, imports and exports for Canada and general statistics relative to the mining industry on capital investment, employment, fuel consumption and power equipment, arranged in 10 chapters, each dealing with a particular branch of the industry. Statistics on production and trade in mineral products appear in detail in the appropriate chapters. A list of operating companies with their office and plant addresses is included. Fully indexed. Chapter titles are: Canada—The Gold Mining Industry—The Silver Mining Industry—The Nickel-Copper Industry—Miscellaneous Metal Mining Industries—The Non-Ferrous Smelting and Refining Industry—The Coal Mining, Coke, Natural Gas, Peat and Petroleum Industries—Non-Metal Mining Industries (Other than Fuels)—The Clay Products and Other Structural Materials Industries—Directory of Reporting Firms—Notes on the Methods of Computing Values—Index.

Coal—

Monthly and Quarterly Reports on Coal and Coke Statistics for Canada.

A condensed report on production, imports and exports of coal and coke is issued monthly, publication being made about the twentieth of the next following month.

A more general review is published quarterly, showing statistics for each month, for the quarter, and for the year to date on the output by coal-mining districts and by provinces, imports and exports by ports and by kinds of coal, employment in coal mining, and tonnage lost. There is also a section on coke showing production, imports, exports, distribution and consumption by months and by provincial groups.

Annual Report on Coal Statistics for Canada.

Text and tables showing for Canada, and for each of the coal-producing provinces, historical and current data on output, tonnage lost, disposition of coal from the mines, domestic and foreign shipments, exports and imports by ports, consumption of coal, prices, employment, salaries and wages paid, power equipment, capital investment, etc.

Annual Bulletins—

(a) MINERAL PRODUCTION—

Metals.—Arsenic—Cobalt—Copper—Gold—Lead—Nickel—Metals of the Platinum Group—Silver—Zinc—Miscellaneous Metals including Aluminium, Antimony, Chromite, Iron ore, Manganese, Mercury, Molybdenum, Tin, Tungsten.

Non-Metals.—Abrasives—Asbestos—Coal—Feldspar—Gypsum—Iron Oxides—Mica—Natural Gas—Petroleum—Quartz—Salt—Talc and Soapstone—Miscellaneous Non-Metallic Minerals including Actinolite, Barytes, Fluorspar, Graphite, Magnesite, Magnesium Sulphate, Mineral Waters, Natro-Alunite, Peat, Phosphate, Pyrites, Sodium Carbonate, Sodium Sulphate.

Structural Materials.—Cement—Clay and Clay Products—Lime—Sand and Gravel—Stone and Slate.

(b) MINERAL INDUSTRY.—Each bulletin of this group shows in synopsis, material to be published subsequently as one chapter of the annual report on the *Mineral Production of Canada*. These bulletins are published in mimeograph form from time to time during the year as the necessary material becomes available.

By Industries.—Gold Mining Industry including Alluvial Gold Mining, Auriferous Quartz Mining and Copper-Gold-Silver Mining—Silver Cobalt and Silver-Lead-Zinc Mining Industry—Nickel-Copper Industry—Miscellaneous Metal Mining Industries—The Non-Ferrous Smelting and Refining Industry—The Coal Mining, Coke, Natural Gas, Peat and Petroleum Industries—Non-Metal Mining Industries (Other than Fuels)—The Clay Products and Other Structural Materials Industries.

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NOTES ON STATISTICS OF PRODUCTION

In the collection of production data, the Dominion Bureau of Statistics makes a division between primary and secondary production. In the first-named class, there are separate sections for the collection of statistics on (a) **Agricultural Products**, (b) **Furs**, (c) **Fish**, (d) **Forest Products**, (e) **Mineral Products**.

In the second are included (a) **Manufacturing** and (b) **Construction**.

Manufacturing is subdivided into nine groups of industries, producing concerns being classified according to the principal component material of their major products. For example, manufactures of leather goods are classified under "Animal Products"; the pulp and paper industry under "Wood and Paper," etc. An outline of the scheme of classification in use for manufacturing industries is given below:—

Manufactures of:

- (1) **Vegetable Products**, including—Coffee and Spices; Cocoa and Chocolate; Preserved and Canned Products; Pickles, Vinegar and Cider; Flour and Cereals; Bread and other Bakery Products; Macaroni and Vermicelli; Distilled and Brewed Liquors and Wines; Rubber Products; Starch and Glucose; Sugar; Tobacco Products; Linseed Oil and Oil Cake.
- (2) **Animal Products**, including—Fish and Fish Products; Dairy Factory Products; Meat and Meat Products; Leather and Leather Products; Furs and Fur Products.
- (3) **Textiles and Textile Products**, including—Cotton Textiles (Cloth, Yarn, Thread and Waste); Woollen Textiles (Cloth, Yarn, Blankets, Felt and Waste); Silk Products; Factory-Made Clothing, Carpets, Rugs and Mats; Cordage, Rope and Twine.
- (4) **Wood and Paper**, including—Pulp and Paper Mill Products; Paper Goods; Printing, Publishing and Lithography; Saw and Planing Mill Products; Furniture, Carriages, Wagons and Sleighs; Wooden Containers; Woodenware; Turned Wood Products; and the Output of Similar Wood-Using Industries.
- (5) **Iron and Steel and their Products**, including—Pig Iron and Ferro-Alloys; Steel and Rolled Products; Castings and Forgings; Boilers, Tanks and Engines; Agricultural Implements; Machinery; Automobiles; Auto Parts and Accessories; Bicycles; Railway Rolling Stock; Wire and Wire Goods; Sheet Metal Products; Hardware and Tools; Miscellaneous Iron and Steel Products; Bridge Building and Structural Steel.
- (6) **Manufactures of Non-Ferrous Metals**, including—Aluminium Products; Brass and Copper Products; Lead, Tin and Zinc Products; Jewellery and Silverware; Electrical Apparatus and Supplies; Miscellaneous Non-Ferrous Metal Products; Non-Ferrous Smelting and Refining.
- (7) **Manufactures of the Non-Metallic Minerals**, including—Aerated Waters; Asbestos Products; Cement; Cement Products; Coke and Gas; Glass (blown, cut, ornamental, etc.); Lime; Petroleum Products; Products from Domestic Clays; Products from Imported Clays; Salt; Sand-Lime Brick; Stone Dressing; Artificial Abrasives and Abrasive Products, Miscellaneous Non-Metallic Mineral Products, including (a) Artificial Graphite and Electrodes, (b) Gypsum Products, (c) Mica Products, (d) Magnesite Products, (e) Miscellaneous Non-Metallic Mineral Products, n.e.s.
- (8) **Chemicals and Allied Products**, including—Coal Tar Distillation; Acids, Alkalies and Salts; Compressed Gases; Explosives, Ammunition and Fireworks; Fertilizers; Medicinal and Pharmaceutical Preparations; Paints, Pigments and Varnishes; Soaps and Washing Compounds; Toilet Preparations; Inks; Adhesives; Polishes and Dressings; Flavouring Extracts, Wood Distillation, Miscellaneous Chemical Products including (a) Baking Powder, (b) Foiler Compounds, (c) Celluloid Products, (d) Insecticides, (e) Sweeping Compounds, (f) Disinfectants; (g) Matches, (h) Dyes and Colours, (i) Miscellaneous Chemical Products, n.e.s.
- (9) **Miscellaneous Products**, including—Brooms and Brushes; Electric Light and Power; Musical Instruments, etc.

The statistics of manufactures are also classified according to the **use or purpose** of the end product as follows:—

- (1) **Food**, including—Breadstuffs; Fish; Nuts; Fruits and Vegetables; Meats; Milk Products; Oils and Fats; Sugar; Infusions; Miscellaneous.
- (2) **Drink and Tobacco**, including—Beverages, alcoholic; Beverages, non-alcoholic; Tobacco.
- (3) **Clothing**, including—Boots and Shoes; Fur Goods; Garments and Personal Furnishings; Gloves and Mitts; Hats and Caps; Knitted Goods; Waterproofs; Miscellaneous.
- (4) **Personal Utilities**, including—Jewellery and Time-Pieces; Recreational Supplies; Personal Utilities, n.e.s.
- (5) **House Furnishings**.
- (6) **Books and Stationery**.
- (7) **Vehicles and Vessels**.
- (8) **Producers' Materials**, including—Farm Materials; Manufacturers' Materials; Building Materials; General Materials.
- (9) **Industrial Equipment**, including—Farming Equipment; Manufacturing Equipment; Trading Equipment; Service Equipment; Light, Heat and Power Equipment; General Equipment.
- (10) **Miscellaneous**.

PREFACE

The present statistical report is issued in continuance of the annual series on the Mineral Production of Canada, which has been published each year since 1886. The reports were first published by the Geological Survey of Canada, later by the Mines Branch of the Department of Mines and since 1921 by the Dominion Bureau of Statistics. A preliminary report on the Mineral Production of Canada is issued on March 15th following the year to which it refers, and the annual report contains the final production data on each mineral produced in Canada, and in addition, statistics on capital invested in the Canadian Mining industry, salaries and wages paid, number of employees and fuel and power consumed. Also, in order that students of the mineral industry may have complete data, imports into and exports from Canada of minerals and mineral products, and world tables of production have been included.

Owing to the lower prices prevailing for metals and various minerals, the value of the 1930 output was less than that of the previous year by 10 per cent, but more gold, copper, zinc, natural gas, petroleum, stone, and sand and gravel were produced than ever before, and the silver and lead outputs exceeded that of the previous year. The production of coal, asbestos, gypsum, salt, clay products, cement and lime were all lower than in 1929.

In addition to actual mining, construction work on large metallurgical plants which had been commenced in the previous years was brought to completion with the result that Canada is well equipped to supply many of the principal metals in the refined form for many years to come.

As in former years, the Bureau has continued to co-operate with the provinces of Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia in the collection of coal statistics; and with the provinces of Quebec, Ontario and British Columbia in the collection of annual mineral production returns, thereby lessening the work of the mine operators in the matter of making returns and also tending to make the compilations more uniform as between the provinces and the Dominion. The Bureau desires to acknowledge its indebtedness to the provincial governments and to other Dominion departments for the valuable assistance rendered in connection with this report.

The thanks of the Bureau are also tendered to mine and smelter operators for assistance given and information made available. The railway and other transportation companies as well as smelter operators outside of Canada have also furnished data, receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. W. H. Losee, B.Sc., chief of the Mining, Metallurgical and Chemical Branch of the Bureau, by Mr. R. J. McDowall, B.Sc., who was assisted by Mr. B. R. Hayden of the mineral division staff.

R. H. COATS,

Dominion Statistician.

DOMINION BUREAU OF STATISTICS,

OTTAWA.

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Table 1.—Quantities and Values of Mineral Products from Canadian Sources 1929 and 1930

		1929			1930		
		Quantity	Value	Per cent of total	Quantity	Value	Per cent of total
METALLICS							
Arsenic (As ² O ³).....	lb.	5,230,088	\$ 171,320	0-06	4,524,220	129,527	0-05
Bismuth.....	lb.	194,329	307,114	0-10	12,732	6,366	.....
Cadmium.....	lb.	773,976	675,294	0-22	.....	337,871	0-12
Chromite.....	tons	126	900	.....	.....	.....	.....
Cobalt.....	lb.	929,415	1,801,915	0-58	694,163	1,144,007	0-41
Copper.....	lb.	248,120,760	43,415,251	13-97	303,478,356	37,948,359	13-56
Gold.....	fine oz.	1,928,308	39,861,663	12-82	2,102,068	43,453,601	15-53
Iron ore sold for export (ilmenite).....	tons	2,748	7,359	.....	412	1,239	.....
Lead.....	lb.	326,522,566	16,544,248	5-32	332,894,163	13,102,635	4-68
Manganese ore.....	tons	.....	.....	.....	273	1,856	.....
Molybdenite.....	lb.	16,150	6,400	.....	.....	.....	.....
Nickel.....	lb.	110,275,912	27,115,461	8-73	103,768,857	24,455,133	8-74
Palladium, Rhodium, Iridium, etc.....	fine oz.	17,318	809,289	0-26	34,092	895,867	0-32
Platinum.....	fine oz.	12,519	846,756	0-27	34,024	1,543,261	0-55
Silver.....	fine oz.	23,143,261	12,264,308	3-94	26,443,823	10,089,376	3-60
Zinc.....	lb.	197,267,087	10,626,778	3-41	267,643,505	9,635,166	3-44
Total.....			154,454,056	49-68		142,743,764	51-00
NON-METALLICS—FUELS							
Coal.....	tons	17,496,557	63,065,170	20-29	14,881,324	52,849,748	18-88
Natural gas.....	M cu. ft.	28,378,462	9,977,124	3-21	29,376,919	10,289,985	3-68
Peat.....	tons	2,607	13,339	.....	2,847	10,932	.....
Petroleum, crude.....	brl.	1,117,368	3,731,764	1-20	1,522,220	5,033,820	1-80
Total.....			76,787,397	24-70		68,184,485	24-36
Actinolite.....	tons	30	375	.....	34	437	.....
Asbestos.....	tons	306,055	13,172,581	4-24	242,114	8,390,163	3-00
Barytes.....	tons	105	2,341	.....	66	1,484	.....
Beryl crystals.....	lb.	4,456	114	.....	.....	.....	.....
Bituminous sands.....	tons	989	3,956	.....	2,067	8,268	.....
Diatomite.....	tons	429	10,330	.....	554	13,247	.....
Feldspar.....	tons	37,527	340,471	0-11	26,796	268,469	0-10
Fluorspar.....	tons	17,870	268,120	0-09	80	1,240	.....
Graphite.....	tons	1,461	103,174	0-03	1,535	96,392	0-04
Grindstones.....	tons	1,947	106,354	0-03	830	62,021	0-02
Gypsum.....	tons	1,211,689	3,345,696	1-08	1,070,968	2,818,788	1-01
Iron oxides.....	tons	6,518	115,932	0-04	6,596	83,873	0-03
Magnesite.....	tons	18,809	491,170	0-16	13,336	336,162	0-12
Manganese, bog.....	tons	301	1,830	.....	275	1,650	.....
Mica.....	tons	4,053	118,549	0-04	1,170	96,004	0-03
Mineral water.....	Imp. gal.	321,905	16,139	.....	227,141	24,481	.....
Phosphate.....	tons	1,185	5,380	.....	40	760	.....
Quartz.....	tons	265,949	561,527	0-18	226,200	418,127	0-15
Salt.....	tons	330,264	1,578,086	0-51	271,695	1,694,631	0-61
Silica brick.....	M	3,951	173,581	0-06	2,418	97,379	0-04
Soapstone.....	tons	.....	47,986	0-01	.....	50,168	0-02
Sodium carbonate.....	tons	600	8,100	.....	364	4,550	.....
Sodium sulphate.....	tons	5,018	64,112	0-02	.....	293,847	0-11
Sulphur*.....	tons	42,781	350,843	0-11	37,730	314,835	0-11
Talc.....	tons	15,509	181,212	0-06	11,841	136,048	0-05
Volcanic dust.....	tons	300	6,000	.....	242	4,840	.....
Total.....			21,073,959	6-77		15,217,864	5-44
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Brick—Soft mud process.....	Face..... M	26,624	538,096	0-17	11,350	247,220	0-09
.....Common.....	M	77,399	1,195,511	0-39	56,487	861,805	0-31
Stiff mud process.....	Face..... M	114,093	2,469,417	0-80	99,284	2,135,871	0-77
.....(wire cut).....	Common..... M	170,840	2,509,451	0-81	105,225	1,480,965	0-53
Dry press.....	Face..... M	38,591	813,461	0-26	29,434	604,197	0-22
.....Common.....	M	26,131	368,039	0-12	16,915	208,495	0-08
Fancy or ornamental brick.....	M	187	12,795	.....	339	27,649	.....
Sewer brick.....	M	4,765	96,588	0-03	804	15,299	.....
Paving brick.....	M	97	3,844	.....	9	297	.....
Firebrick.....	M	5,196	251,043	0-08	3,789	177,608	0-06
Fireclay.....	tons	5,041	35,226	0-01	2,870	25,975	.....
Fireclay blocks and shapes.....	.....	.....	130,411	0-04	.....	147,309	0-05
Hollow blocks.....	tons	221,800	2,214,384	0-71	165,359	1,667,783	0-60
Roofing tile.....	No.	35,075	4,628	.....	3,056	356	.....
Floor tile (quarries).....	sq. ft.	307,400	70,186	0-02	179,786	56,230	0-02
Drain tile.....	M	25,000	720,316	0-23	25,291	687,070	0-25
Sewer pipe, copings, flue linings, etc.....	tons	.....	2,005,887	0-65	.....	1,721,815	0-62
Pottery, glazed or unglazed.....	tons	.....	323,194	0-10	.....	294,866	0-11
Bentonite.....	tons	.....	.....	.....	74	1,396	.....
Other clay products.....	.....	.....	142,166	0-05	.....	231,372	0-08
Total.....			18,904,643	4-47		10,593,578	3-79
Cement.....	brl.	12,284,081	19,337,235	6-23	11,032,538	17,713,067	6-33
Lime.....	tons	674,087	5,908,610	1-90	490,802	4,038,698	1-44
Sand and gravel.....	tons	27,846,945	7,317,814	2-36	28,547,511	8,344,913	2-98
Slate.....	tons	.....	.....	.....	150	3,000	.....
Stone—							
Granite.....	tons	1,728,165	3,080,815	0-99	1,851,132	3,379,951	1-21
Limestone.....	tons	7,720,840	8,172,681	2-63	7,732,675	8,075,616	2-89
Marble.....	tons	14,012	414,062	0-14	26,089	809,582	0-29
Sandstone.....	tons	159,407	398,974	0-13	384,610	769,060	0-27
Total.....			44,630,191	14-38		43,133,887	15-41
Grand total.....			310,859,246	100-00		279,873,578	100-00

* Sulphur content of pyrites shipped and estimated sulphur contained in the sulphuric acid made from bessemer gases.

Table 2.—Increase or Decrease in Quantities and Values of Mineral Products from Canadian Sources in 1930 as Compared with 1929

		Increase (+) or Decrease (—)		Increase (+) or Decrease (—)	
		Quantity	per cent	Value	per cent
METALLICS					
Arsenic.....	lb.	— 705,868	— 13.5	\$ 41,793	— 24.4
Bismuth.....	lb.	— 181,597	— 93.4	— 300,748	— 97.9
Cadmium.....	lb.	—	—	337,423	— 50.0
Chromite.....	tons	— 126	—	900	—
Cobalt.....	lb.	— 235,252	— 25.3	657,908	— 36.5
Copper.....	lb.	+55,357,596	+ 22.3	5,466,892	— 12.6
Gold.....	fine oz.	+ 173,760	+ 9.0	+ 3,591,938	+ 9.0
Titaniferous Iron ore sold for export.....	tons	— 2,336	— 85.0	6,120	83.2
Lead.....	lb.	+ 6,371,597	+ 2.0	3,441,613	— 20.8
Manganese Ore.....	tons	+ 273	—	+ 1,356	—
Molybdenite.....	lb.	— 16,150	—	6,400	—
Nickel.....	lb.	— 6,507,055	— 5.9	2,660,328	— 9.8
Palladium, Rhodium, Iridium, etc.....	fine oz.	+ 16,774	+ 96.9	+ 86,578	+ 10.7
Platinum.....	fine oz.	+ 21,505	+ 171.8	+ 696,505	+ 82.3
Silver.....	fine oz.	+ 3,300,562	+ 14.3	+ 2,174,932	+ 17.7
Zinc.....	lb.	+70,376,418	+ 35.7	991,612	— 9.3
Total.....				—11,710,292	— 7.6
NON-METALLICS					
Coal.....	tons	— 2,615,233	— 14.9	—10,215,422	— 16.2
Natural gas.....	M cu. ft.	+ 998,457	+ 3.5	+ 312,861	+ 3.1
Peat.....	tons	+ 240	+ 9.2	2,407	— 18.0
Petroleum.....	brl.	+ 404,852	+ 36.2	+ 1,302,056	+ 34.8
Total.....				— 8,602,912	— 11.2
Actinolite.....	tons	+ 4	+ 13.3	62	+ 16.5
Asbestos.....	tons	— 63,941	— 20.9	4,782,418	— 36.3
Barytes.....	tons	— 39	— 37.1	857	— 36.6
Beryl crystals.....	lb.	— 4,456	—	114	—
Bituminous sands.....	tons	+ 1,078	+ 109.1	4,312	+ 109.0
Diatomite.....	tons	— 125	— 29.1	2,917	— 28.2
Feldspar.....	tons	— 10,731	— 28.6	72,002	— 21.1
Fluorspar.....	tons	— 17,790	— 99.5	266,880	— 99.5
Graphite.....	tons	+ 74	+ 5.4	6,782	— 6.6
Grindstones.....	tons	— 1,117	— 57.4	44,333	— 41.7
Gypsum.....	tons	— 140,721	— 11.6	526,908	— 15.7
Iron oxides.....	tons	— 78	— 1.2	32,059	— 27.7
Magnesite.....	tons	— 5,473	— 29.1	155,008	— 31.6
Manganese, bog.....	tons	— 26	— 8.6	180	— 9.8
Mica.....	tons	— 2,883	— 71.1	22,545	— 19.0
Mineral water.....	Imp. gal.	94,704	— 29.4	8,342	+ 51.7
Phosphate.....	tons	— 1,451	— 96.6	4,620	— 85.9
Sulphur.....	tons	— 5,051	— 11.8	36,008	— 10.3
Quartz.....	tons	— 39,749	— 14.9	143,400	— 25.5
Salt.....	tons	— 58,569	— 17.7	+ 116,545	+ 7.4
Silica brick.....	M	— 1,533	— 38.8	76,202	— 43.9
Soapstone.....	tons	—	—	+ 2,182	+ 4.5
Sodium carbonate.....	tons	— 236	— 39.3	3,550	— 43.8
Sodium sulphate.....	tons	—	+ 529.2	+ 229,735	+ 358.3
Talc.....	tons	— 3,668	— 23.7	45,164	— 24.9
Volcanic dust.....	tons	— 58	— 19.3	1,160	— 19.3
Total.....				— 5,856,095	— 27.8
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS					
Brick—Soft mud process—(Face.....	M	— 15,274	— 57.4	— 290,876	— 54.1
Common.....	M	— 20,912	— 27.0	— 333,706	— 27.9
Stiff mud process (wire cut)—(Face.....	M	— 14,809	— 13.0	— 333,546	— 13.5
Common.....	M	— 65,615	— 38.4	— 1,028,486	— 41.0
Dry press—Face.....	M	— 9,157	— 23.7	— 209,264	— 25.7
Common.....	M	— 9,216	— 35.3	— 159,544	— 43.3
Fancy or ornamental brick.....	M	+ 152	+ 81.3	+ 14,854	+ 116.1
Sewer brick.....	M	— 3,961	— 83.1	— 81,289	— 84.2
Paving brick.....	M	— 88	— 90.7	— 3,547	— 92.3
Firebrick.....	M	— 1,407	— 27.1	73,435	— 29.3
Fireclay and other clay.....	tons	— 2,171	— 43.1	9,251	— 26.3
Fireclay blocks and shapes.....	\$	—	—	+ 16,898	+ 13.0
Hollow blocks.....	tons	— 56,441	— 25.4	546,601	— 24.7
Roofing tile.....	No.	— 32,019	— 91.3	4,272	— 92.3
Floor tile (quarries).....	sq. ft.	— 127,614	— 41.5	13,956	— 19.9
Drain tile.....	M	+ 291	+ 1.2	33,246	— 4.6
Sewer pipe, copings, flue linings, etc.....	\$	—	—	284,072	— 14.2
Pottery, glazed or unglazed.....	\$	—	—	28,328	— 8.8
Bentonite.....	tons	+ 74	—	+ 1,396	—
Other clay products.....	\$	—	—	+ 89,206	+ 62.7
Total.....				— 3,311,065	— 23.8
Cement.....	brls.	— 1,251,543	— 10.2	— 1,624,168	— 8.4
Lime.....	tons	— 183,285	— 27.2	— 1,869,912	— 31.6
Sand and gravel.....	tons	+ 700,566	+ 2.5	+ 1,027,099	— 14.0
Slate.....	tons	+ 150	—	+ 3,000	—
Stone—					
Granite.....	tons	+ 122,967	+ 7.1	+ 299,136	+ 9.7
Limestone.....	tons	+ 11,835	+ 0.2	+ 97,065	+ 1.2
Marble.....	tons	+ 12,077	+ 86.2	+ 395,520	+ 95.5
Sandstone.....	tons	+ 225,203	+ 141.3	+ 370,086	+ 92.8
Total.....				— 1,496,304	— 3.4
Grand total.....				—30,976,668	— 10.0

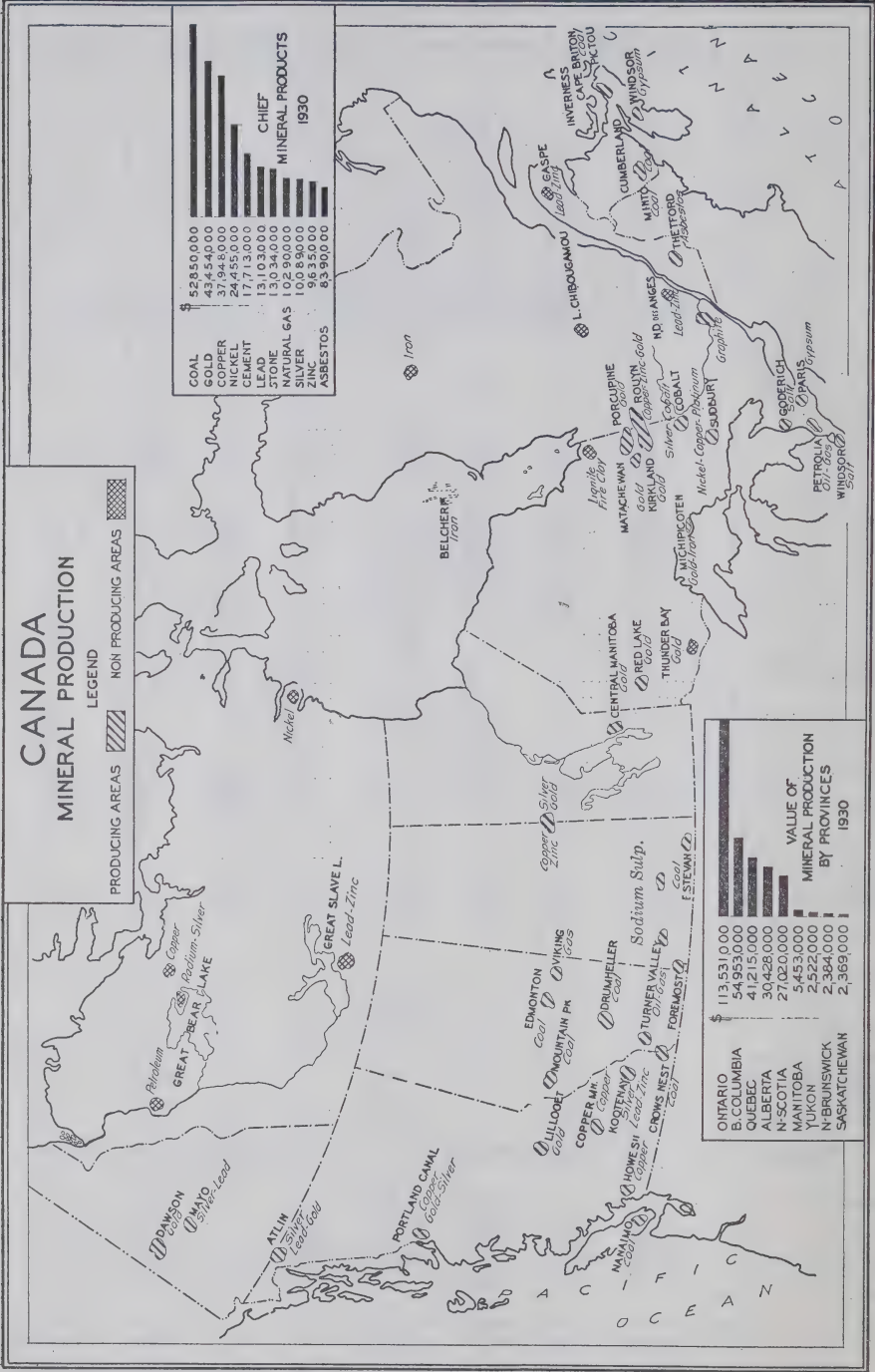
Table 3.—Mineral Production of Canada, by Provinces, 1930

	Nova Scotia	New Brun- swick	Quebec	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia	Yukon
METALLICS									
Arsenic..... lb.				2,750,887				1,773,333	
..... \$				109,932				19,595	
Bismuth..... lb.				12,732					
..... \$				6,366					
Cadmium..... lb.								337,871	
..... \$									
Chromite..... tons									
..... \$									
Cobalt..... lb.				694,163					
..... \$				1,144,007					
Copper..... lb.			80,310,363	127,718,871	2,087,609			93,318,885	42,628
..... \$			10,425,891	15,187,259	215,018			12,114,657	5,534
Gold..... fine oz.	1,272		141,747	1,736,012	23,189			164,331	35,517
..... \$	26,295		2,930,170	35,886,552	479,359			3,397,023	734,202
Titaniferous Iron ore tons			412						
..... \$			1,239						
sold for export.									
Lead..... lb.				2,193,856				321,803,725	8,896,582
..... \$				116,034				12,637,232	349,369
Manganese Ore..... tons	4	269							
..... \$	60	1,296							
Nickel..... lb.				103,768,857					
..... \$				24,455,133					
Palladium, Rhodium, etc..... fine oz.				34,040				52	
..... \$				894,511				1,356	
Platinum..... fine oz.				34,000				24	
..... \$				1,542,172				1,089	
Silver..... fine oz.	67		571,164	10,205,683	94,653			11,825,930	3,746,326
..... \$	26		217,922	3,893,876	36,114			4,512,065	1,429,373
Zinc..... lb.			9,754,160	3,527,894	3,882,141			250,479,310	
..... \$			351,150	127,004	139,787			9,017,255	
Totals..... \$	26,351	1,296	13,926,372	83,362,846	870,248			42,038,143	2,518,478
NON-METALLICS FUELS									
Coal..... tons	6,252,552	209,349				579,424	5,755,528	2,083,818	653
..... \$	24,528,860	864,118				968,863	18,063,225	8,421,572	3,110
Natural gas.... M cu. ft.		661,975		7,965,761	600		20,748,583		
..... \$		325,751		5,034,828	180		4,929,226		
Peat..... tons			2,219	628					
..... \$			9,330	1,602					
Petroleum, crude... bbl.		6,758		117,302			1,398,160		
..... \$		17,378		235,746			4,780,696		
Total..... \$	24,528,860	1,207,247	9,330	5,272,176	180	968,863	27,773,147	8,421,572	3,110
Other Non-Metallics									
Actinolite..... tons				34					
..... \$				437					
Asbestos..... tons			242,114						
..... \$			8,390,163						
Barytes..... tons	66								
..... \$	1,484								
Beryl crystals..... lb.									
..... \$									
Bituminous sands... tons							2,067		
..... \$							8,268		
Diatomite..... tons	398			10				146	
..... \$	7,960			140				5,147	
Feldspar..... tons			17,074	9,722					
..... \$			163,802	104,667					
Fluorspar..... tons				80					
..... \$				1,240					
Graphite..... tons			197	1,338					
..... \$			9,850	86,542					
Grindstones..... tons	6	495						329	
..... \$	100	35,689						26,222	
Gypsum..... tons	827,063	82,674		94,946	34,157			32,128	
..... \$	982,287	513,677		776,069	298,297			248,458	
Iron oxides..... tons			6,590					6	
..... \$			83,753					120	
Magnesite..... tons			13,336						
..... \$			336,162						
Manganese, bog..... tons		275							
..... \$		1,650							
Mica..... tons			430	740					
..... \$			61,729	34,275					
Mineral water. Imp. gal.			12,941	214,200					
..... \$			3,727	20,754					
Phosphate..... tons			40						
..... \$			760						
Pyrites (see Sulphur)									
Quartz..... tons	8,057		49,561	167,487				1,095	
..... \$	18,494		119,668	274,674				5,291	
Salt..... tons	23,058			248,637					
..... \$	136,226			1,558,405					
Silica brick..... M	2,040			378					
..... \$	78,259			19,120					

Table 3.—Mineral Production of Canada, by Provinces, 1930—Concluded

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon
Soapstone..... tons									
\$			50,168						
Sodium carbonate... tons								364	
\$								4,550	
Sodium sulphate... tons						31,571			
\$						293,847			
Sulphur*..... tons			12,653	7,277				17,800	
\$			93,038	73,855				147,942	
Talc..... tons				11,664				177	
\$				133,213				2,835	
Volcanic dust..... tons						242			
\$						4,840			
Total..... \$	1,224,820	551,016	9,312,820	3,083,391	298,297	298,687	8,268	440,565	
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS									
Brick—									
Soft mud process—									
Face..... M	240			9,798			1,312		
\$	3,360			201,860			42,000		
Common..... M	730	3,877	1,258	24,674	9,720	1,189	7,298	7,741	
\$	9,718	62,625	12,754	375,088	156,585	16,867	92,158	136,010	
Stiff mud process (wire cut)—									
Face..... M	962	1,124	33,585	57,001	1,204	1,691	2,589	1,128	
\$	26,608	27,836	743,641	1,178,026	26,604	54,842	37,468	40,846	
Common..... M	7,212	1,913	65,867	22,800		4,823	2,258	352	
\$	98,133	28,711	927,218	346,126		55,159	20,549	5,069	
Dry press—									
Face..... M			2,660	21,835		282	3,751	906	
\$			67,291	431,858		9,058	61,616	34,549	
Common..... M				4,246			10,886	1,785	
\$				58,530			124,585	25,380	
Fancy or ornamental brick.... M			74	265					
\$			3,791	23,858					
Sewer brick..... M				722				82	
\$				12,490				2,809	
Paving brick..... M								9	
\$								297	
Firebrick..... M						504	16	3,269	
\$						28,001	832	148,775	
Fireclay..... tons	1,269	46				504	30	1,021	
\$	5,720	1,814				3,920	450	14,071	
Bentonite..... tons								74	
\$								1,396	
Fireclay blocks and shapes..... \$	525	552				118,122		28,110	
Hollow blocks..... tons	9,378	600	39,789	85,155	1,335	7,566	13,123	8,433	
\$	107,998	8,888	484,605	791,474	17,754	60,214	111,807	85,043	
Roofing tile (quarries) No.				3,056					
\$				356					
Floor tiles (quarries) sq. ft.				179,047		739			
\$				56,054		176			
Drain tile..... M	111	5	835	22,783	310	25	58	1,164	
\$	3,796	193	28,763	593,980	15,024	1,000	3,785	40,529	
Sewer pipe, copings, flue linings, etc.... \$	239,475		195,981	834,361			335,033	116,965	
Pottery, glazed or unglazed..... \$		31,917		89,331			167,402	6,166	
Other clay products \$				227,947		1,924		1,501	
Total..... \$	495,333	162,536	2,464,044	5,221,214	215,967	349,283	997,685	687,516	
Cement..... brl.			4,865,609	3,942,690	977,906		525,289	721,044	
\$			7,031,528	5,779,404	2,268,742		1,144,160	1,489,233	
Lime..... tons	31,114	12,521	129,350	252,066	24,098		5,136	36,517	
\$	113,250	135,304	967,650	2,177,587	260,325		49,525	335,057	
Sand and gravel.... tons	525,683	357,551	6,581,807	12,027,082	1,253,103	3,680,553	1,626,989	2,494,743	
\$	310,407	41,303	1,750,690	3,783,830	453,944	751,779	433,221	819,739	
Slate..... ton								150	
\$								3,000	
Stone..... tons	152,463	111,612	3,818,126	5,396,223	147,078		7,903	361,091	
\$	320,316	284,869	5,752,786	4,850,528	1,085,479		21,736	718,495	
Total..... \$	743,973	461,476	15,502,654	16,591,349	4,068,490	751,779	1,648,642	3,365,524	
Grand total..... \$	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182	2,368,612	30,427,742	54,953,320	2,521,588

* Sulphur content of pyrites shipped and estimated quantity of sulphur contained in the sulphuric acid made from bessemer gases.



DOMINION BUREAU OF STATISTICS

R. H. COATS, B.A., F.S.S., (Hon.) F.R.S.C., Dominion Statistician

W. H. LOSEE, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch.

ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR 1930

CHAPTER ONE

GENERAL REVIEW.—The almost continuous and widespread expansion and prosperity experienced throughout the Canadian mining industry during recent years was severely affected during the world wide business depression of 1930. Falling prices and decreased consumption resulted in a recession from our high record production value of \$310,850,246 in 1929 to \$279,873,578 for 1930, or a decrease of 10 per cent. The total for 1930 represents a value of \$27.65 per capita. In a survey of the major mineral groups we find general decreases in value as compared to the previous year, some of the individual and more important members of the metal group registered increased outputs but with greatly reduced values; this was due to exceptionally low metal prices. Metals retained a position of premier importance with a total value of \$142,743,764; this was a decrease for this group of 7.6 per cent below the corresponding value for 1929. Fuels, including coal, peat, natural gas and petroleum, attained a combined value of \$68,184,485, a decrease of 11.2 per cent; the other important division of the non-metallics represented largely by silicates, sulphates and various rock forming minerals, registered an output valuation of \$15,217,864, or 27.8 per cent less than in 1929; clay products were appraised at \$10,593,578, or 23.8 per cent below the 1929 valuation of \$13,904,643; cement and other structural materials valued at \$43,133,887 were 3.4 per cent less than last year.

Capital, employed in the mining industry in Canada during 1930 amounted to \$887,420,859; this wealth, in addition to supplying operating funds for active companies, was utilized in equipping and developing the metallurgical plants and mines of the nation.

This great and highly developed industry, with its varied and far flung activities, supported 89,200 employees in the operation of mines, oil fields, smelters, refineries, mills, quarries, and in other associated spheres of mineral production; salaries and wages amounted to \$113,975,332.

Early history of Canadian mining, gleaned from records of the period of the French regime, is closely interwoven with that of the first European navigators and explorers to reach our shores. In 1604 discoveries in Nova Scotia of iron and silver were reported to have been made in St. Mary's Bay and later, copper was found at Cape d'Or. These minerals were located by Master Simon, a mining engineer, in the employ of the celebrated explorer, Champlain. A natural history of Acadia, written by Nicholas Denys, and published in Paris in 1672 mentions the discovery of coal in Nova Scotia and is the first reference to the occurrence of this mineral in North America; metallurgical operations involving the smelting of bog and other iron ores were carried

out on the St. Maurice river and other points along the north shore of the St. Lawrence as early as the year 1730. Other mineral discoveries followed closely the water routes of both the early French and British explorers. Argentiferous galena was found, some two hundred years ago, on the shores of Lake Temiskaming, Quebec, within a few miles of the present mining operations in the Cobalt silver camp.

In the far west coal was found at Fort Rupert in 1835 and placer gold was discovered in 1858 along the Fraser and other rivers in British Columbia; these early events in the mining history of this province were forerunners to the more important development of large copper and silver-lead-zinc ore bodies, a development made possible largely through the construction of trans-continental railroads.

Almost coincident with these western events were the pioneer efforts of the eastern provinces to establish mining and metallurgical industries capable of supplying the metal requirements of a virile and increasing population. During the period from 1843-1870 iron and copper ores were produced in Ontario and Quebec. Gold ores were discovered and mines operated in Hastings county, Ontario; iron furnaces were constructed at Three Rivers, Radnor Forges and Drummondville, Quebec; bog iron was the principal ore treated and charcoal was usually employed as fuel. Placer gold deposits were discovered in the basin of the Chaudière river in Quebec in 1823. In Nova Scotia the production of lode gold from 1862 to 1930 amounted to 924,208 fine ounces.

Railroad construction in Canada has proven a very important factor in the development of the Canadian mining industry. This work was almost directly responsible for the discovery of the Sudbury nickel ores in 1883 and the silver ores of the Cobalt mining camp in 1903. The importance of the nickel deposits to the industrial life of Canada was especially emphasized during recent years by the magnitude of the expansion program in the mining and metallurgical operations of the International Nickel Company at Sudbury.

In 1886 mineral production in the Dominion amounted to \$10,000,000 or approximately \$2.23 per capita. Following the sensational placer gold discoveries in the Yukon in 1897, production amounted to \$66,000,000 or \$12.16 per capita. A steady increase in the value of mineral production is recorded from 1904 to 1918, some annual declines were experienced during the post war depression period. These, however, were only transitory and with the increasing flow of wealth, largely from the mines of Rouyn, Thetford, Porcupine, Kirkland Lake, Sudbury, Southern British Columbia and the Pacific coast, Canada has attained a position of prominence in the mining industry of the world, a position which, in 1930, placed her first in asbestos and nickel, second in gold, third in silver, and fourth in copper, lead and zinc.

METALLICS.—Metallic mineral production totalled \$142,743,764 in 1930 as compared with \$154,454,056 during the previous year.

Arsenic production amounted to 4,524,220 pounds valued at \$129,527; this included both white arsenic and arsenic contained in exported concentrates. This output was 705,868 pounds less than in 1929. All white arsenic manufactured in Canada comes from the Deloro Smelting & Refining Company, Ltd., Deloro, Ontario.

Bismuth produced in 1930 was very much less than in 1929, amounting to only 12,732 pounds valued at \$6,366 as compared with 194,329 pounds worth \$307,114 in the preceding year. The total 1930 Canadian production of bismuth was contained in silver-lead-bismuth bullion exported for treatment in foreign refineries.

Cadmium consumption in electroplating has increased rapidly during recent years. This metal was produced commercially in Canada for the first time in 1928. The production in 1930 represented a by-product in the electrolytic refining of zinc by the Consolidated Smelting and Refining Company at Trail, B.C. Output for the year was considerably less than in 1929.

Cobalt at 694,163 pounds and a valuation of \$1,144,007 represents a decrease of 235,252 pounds from the output for 1929. This loss was occasioned largely by the curtailment in mining of silver-cobalt ores owing to the extremely low prices for silver.

Copper from various primary sources of the metal in Canada amounted to 303,478,356 pounds, a very substantial increase over the 1929 output of 248,120,760 pounds. This production constitutes a new high record in the Canadian copper mining industry. Quebec pro-

duction at 80,310,363 pounds represents an increase of 24,973,194 pounds over 1929 and is due chiefly to expanding operations at the Noranda mine; in Ontario the increase during 1930 amounted to 38,839,018 pounds. Copper production in this province comes chiefly from the nickel-copper mines at Sudbury. A decrease of 10,584,853 pounds below the 1929 production was recorded in British Columbia and reflects the lessened demand and low prices for the metal in 1930. The average price of copper on the New York market during 1930 was \$0.1298 per pound as compared with \$0.1810 in 1929.

Gold production during 1930, from all sources in Canada, amounted to 2,102,068 fine ounces valued at \$43,453,601 as against 1,928,308 fine ounces valued at \$39,861,663 in 1929. This constitutes the largest output ever recorded in Canada and establishes the Dominion in the position of the world's second greatest gold producer.

Six provinces and the Yukon produced gold as follows: Nova Scotia, 1,272 fine ounces; Quebec, 141,747 fine ounces; Ontario, 1,736,012 fine ounces; Manitoba, 23,189 fine ounces; British Columbia, 164,331 fine ounces; Yukon, 35,517 fine ounces.

Gold held second place in point of value among Canada's mineral products in 1930, being surpassed only by coal; the value of gold represented 15.5 per cent of the total mineral production of the Dominion in 1930. South Africa with a production of 10,716,351 fine ounces remains the leading gold producing country. The United States (exclusive of Philippine Islands) was third with an output of 2,100,395 fine ounces.

The total 1930 Canadian production was recovered from the following sources: fine gold contained in crude bullion by gold mines, 1,782,875 fine ounces; alluvial gold, 42,324 fine ounces; fine gold in blister copper and base bullion made at Canadian smelters from Canadian ores, 172,642 fine ounces; and the estimated recovery of gold in ores, matte, slags and concentrates exported to foreign smelters, 104,227 fine ounces.

In Ontario the Porcupine area contributed 859,084 fine ounces; Kirkland Lake mines 830,733 fine ounces; Sudbury district ores yielded 23,803 fine ounces, and 22,392 fine ounces came from properties operating in Red Lake, Kenora, Michipicoten and other districts.

Lead production in 1930 amounted to 332,894,163 pounds valued at \$13,102,635. This represents nearly a two per cent increase in quantity over the 1929 output. The value, however, was much lower owing to the very depressed prices for the metal. The greater quantity of exported pig and refined lead goes in the order of its value to Great Britain, Japan, France, China, Germany, and Belgium; lesser quantities are shipped to various other countries in Europe and South America. Metal from the Trail plant of the Consolidated Mining and Smelting Company, Ltd., continues to constitute the greater part of the annual lead production of Canada.

Nickel produced from the ores of the Sudbury area, Ontario, and to a small extent from the Cobalt, Gowganda and South Lorraine mines amounted to 103,768,857 pounds valued at \$24,455,133 as compared with 110,275,912 pounds worth \$27,115,461 in 1929. This production is a 5.9 per cent decrease in quantity from that of the previous year and includes the nickel in matte exported by the International Nickel Company of Canada, Ltd., and Falconbridge Nickel Mines, Ltd.; refined and electrolytic nickel produced at Port Colborne, Ontario, and nickel in nickel oxides, made by the International Nickel Company and in oxides, salts and speiss made by the Deloro Smelting and Refining Company.

Silver obtained from all sources in Canada during 1930 amounted to 26,443,823 fine ounces which, valued at the average price for the year of 38.154 cents per fine ounce, was worth \$10,089,376 as against the 1929 output of 23,143,261 fine ounces valued at \$12,264,308 with silver then selling at an average price of 52.993 cents per fine ounce.

An output of 11,825,930 fine ounces of silver in British Columbia during 1930 established a new high production record for this metal in that province. The principal producing mines were the Sullivan, Premier and Prosperity; smaller recoveries were made in the refining of bullion produced in alluvial and auriferous quartz mining. Copper ores and concentrates exported to foreign smelters and blister copper made at the Granby smelter contributed considerably to the total silver production. Ontario, the second largest producer of silver among the provinces, recorded an output of 10,205,683 fine ounces, 80 per cent of which was in the form of bullion produced from cobalt ores; the remainder was contained in concentrates exported, in gold bullion

produced in gold mines, in the nickel-copper and copper-lead-zinc ores of the Sudbury basin, and in gold, silver and copper ores shipped to the Noranda smelter at Rouyn. Quebec's silver production for 1930 came entirely from auriferous quartz ores, the metal contained in blister copper produced at the Noranda smelter and in copper concentrates exported. The Yukon production totalled 3,746,326 fine ounces and was an increase over the previous year. This increase was occasioned through increased exports of silver-lead concentrates. Minor quantities of silver are recovered in the treatment of ores occurring in Manitoba and Nova Scotia.

Zinc production in 1930 amounted to 267,643,505 pounds, with a valuation of \$9,635,166. This output is a 35.6 per cent increase in quantity over that of 1929 and creates a new high record in Canadian zinc production; owing to the drastic fall in the price of zinc from 5.387 cents a pound in 1929 to 3.6 cents in 1930, the total value of zinc produced, valued at the average London quotation for 1930, was less than that of the previous year. Refined zinc was made in British Columbia at the Trail works of the Consolidated Mining and Smelting Company, Ltd., and for the first time in the new plant of the Hudson Bay Mining and Smelting Co. Ltd. at Flin Flon, Manitoba. In 1930 the Base Metals Mining Corporation made important shipments of zinc concentrates from the Monarch mine at Field, British Columbia. In Ontario zinc production was represented by the metal contained in concentrates exported from the Errington mine, Sudbury. Zinc concentrates made from the copper-zinc sulphide ores of the Amulet mine, Quebec, were exported to foreign smelters.

FUELS AND OTHER NON-METALLICS.—This division of Canadian mineral production, including among its more important items—coal, natural gas, petroleum, asbestos, gypsum and salt—realized in 1930 a valuation of \$83,402,349. This is a decrease from 1929 of 17 per cent.

Coal, the principal Canadian mineral product, suffered in 1930 a production decrease of 2,615,233 tons or nearly 15 per cent less than in 1929. This marks the second consecutive year that the coal mining industry has registered decreases in output. In the provinces, Nova Scotia's production of 6,252,552 was 803,581 tons less than in 1929; New Brunswick's output of 209,349 tons in 1930 was lower by 9,357 tons than in the previous year; Saskatchewan's production of 579,424 tons was only 765 tons less than in 1929; Alberta with an output of 5,755,528 tons realized a loss of over 19 per cent below that of the preceding year; in British Columbia the production at 2,083,818 tons was 16.3 per cent less than in 1929; the Yukon showed a small increase in tonnage. Nova Scotia, New Brunswick, British Columbia, and the Yukon mined bituminous coal only; Saskatchewan production is confined to lignites and Alberta produces bituminous, sub-bituminous and lignite. In 1930 the British Columbia Coal Committee was formed and represents those interested in improving the coal industry of the province. In recent years coal has been displaced by oil in many fields and it is sought to demonstrate that coal handled efficiently can compete with oil in cost, desirability and freedom from disagreeable features.

Exports of Canadian coal in 1930 amounted to 624,512 tons, a decrease of nearly 26 per cent from the 1929 total of 842,972 tons. The United States and Newfoundland afforded the principal foreign markets for Canadian coal; importation of Russian anthracite in 1930 amounted to 291,407 tons valued at \$1,901,975 as compared with 117,304 tons worth \$691,928 in 1929. Combined imports of anthracite, bituminous and lignite coal into Canada were 17,620,074 tons as against 18,619,300 tons in 1929. Receipts from Great Britain during the year were 996,127 tons of anthracite and 146,199 tons of bituminous, a total of 1,142,326 tons as compared with a total of 844,826 tons in 1929. The United States shipped into Canada 13,199,076 tons of bituminous, 2,955,954 tons of anthracite, and 18,676 tons of lignite during 1930. Drilling to date by the Ontario government at Blacksmith Rapids on the Abitibi river has shown an average thickness of about thirty feet of lignite over an area of more than five square miles. Steel for the Temiskaming and Northern Ontario Railway extension to James Bay reached this area in the spring of 1930.

Natural gas production from fields in New Brunswick, Ontario, Manitoba, and Alberta was 29,376,919 thousand cubic feet valued at \$10,289,985, a new high record in this industry, and a gain of 3.5 per cent in quantity and 3.1 per cent in value over the production in 1929. Alberta, with an output of 20,748,583 thousand cubic feet contributes 70.6 per cent of the Cana-

dian total. The staking of Quebec lands as gas and oil claims which commenced in the fall of 1929, continued throughout 1930 in the counties south of the St. Lawrence river. It is expected that drilling operations with a depth objective of 6,000 feet will commence in the spring of 1931.

Crude petroleum produced from wells in New Brunswick, Ontario, and Alberta established in 1930 a new high record in the oil producing industry of Canada. The various fields yielded 1,522,220 barrels valued at \$5,033,820. This output exceeded the total of 1929 by 36.2 per cent in quantity and 34.9 per cent in value. The unbroken series of annual increases in the Canadian production of crude petroleum since 1925 is largely the result of successful developments in the Turner Valley field in Alberta. Drilling operations in this field continued during 1930. Only one refinery in Alberta operated entirely on Canadian crude, however, three others in that province, one in Saskatchewan and two in Ontario used some Canadian oil in conjunction with a much larger supply from the United States fields.

Asbestos shipments in Canada during 1930 amounted to 242,114 tons valued at \$8,390,163 and represented decreases of 20.9 per cent in quantity and 36.3 per cent in value from that of 1929. Average selling values ranged from \$480.21 per ton for crude No. 1 to \$14.84 for fillers, floats and other short fibres. Some of the producing mines closed down during the year and there was an almost general curtailment of mining operations throughout the Quebec asbestos areas. Canada's 1930 exports of non-fabricated asbestos, including sand and waste, consisted of 235,500 tons and comprised shipments of 6,632 tons to Great Britain, 188,462 tons to the United States, 481 tons to Australia, 11,978 tons to Belgium, 5,545 tons to France, 6,588 tons to Germany, 3,076 tons to Italy, 8,605 tons to Japan, 2,391 tons to the Netherlands and smaller tonnages to Argentina, Spain, Peru and India.

Gypsum produced from deposits in Nova Scotia, New Brunswick, Ontario, Manitoba and British Columbia totalled 1,070,968 tons valued at \$2,818,788 as compared with 1,211,689 tons appraised at \$3,345,696 in 1929. These figures reflect the general and intensified industrial depression of 1930. Gypsum quarried amounted to 1,100,048 tons of which quantity 168,967 tons or 15.3 per cent was calcined in Canada. Approximately 78 per cent of the Nova Scotia production was shipped as crude gypsum to the United States. Exports of crude gypsum during 1930 consisted of 719,381 tons valued at \$871,567, this tonnage went entirely to the United States. Plaster of Paris with ground and prepared wall plasters exported during the year totalled 7,282 tons and consisted chiefly of shipments to New Zealand and the United States.

Salt output in Canada in 1930 amounted to 271,695 tons. This is a decrease of 17.7 per cent from the 1929 production. The value in 1930 at \$1,694,631 was, however, greater as compared with the previous year's valuation of \$1,578,086. Shipments in 1930, exclusive of the salt content of brine used in the manufacture of chemicals, averaged \$10.05 per ton as against \$8.70 per ton in 1929. Canadian exports of salt in 1930 were 8,758 tons as against 9,359 tons in 1929. Imports of salt totalled 128,385 tons valued at \$660,903, or a decrease of 27.2 per cent in quantity and 29.4 per cent in value from the preceding year.

In the non-metallic group are several other minerals of economic importance. These are represented largely by various silicates, sulphates and rock forming minerals. Shipments of Canadian feldspar by Canadian producers amounted to 26,796 tons valued at \$268,469 in comparison with 37,527 tons worth \$340,471 in 1929. This production represents a decrease of 28.5 per cent in quantity and 21.1 per cent in value from the output for 1929. Mica production was considerably less in both quantity and value and decreased productions were recorded for grindstones, pulpstones and scythestones, volcanic dust, barytes, fluorspar, magnesite, mineral waters, silica brick and sulphur (pyrites). Increases were registered in the production of actinolite, bituminous sands, graphite and sodium sulphate.

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS.—In 1930 there was a distinct curtailment in the general production of structural materials and as compared with the previous year losses were recorded in the output of all items in these groups with the exception of stone, sand and gravel, and a few of the less important clay products. The value of clay and clay products sold by Canadian producers during 1930 declined 23.8 per cent below the preceding year. Production during the year was valued at \$12,737,540 which included the total sales of clay and clay products produced from domestic clays and the value added by manufacturing in the branch of this industry using imported clays. Cement shipments in 1930 from plants

located in Quebec, Ontario, Manitoba, Alberta and British Columbia totalled 11,032,538 barrels valued at \$17,713,067 as compared with 12,284,081 barrels worth \$19,337,235 in 1929. Quebec mills produced 44 per cent of the total Canadian cement shipments; Ontario, 36 per cent; Manitoba, 9 per cent; Alberta, 5 per cent; and British Columbia, 6 per cent. Sand and gravel produced in 1930 amounted to 28,547,511 tons valued at \$8,344,913 as against 27,846,945 tons appraised at \$7,317,814 in 1929. A lime output of 490,802 tons was valued at \$4,038,698; this quantity and value were both lower than during the preceding year. Stone production during 1930 was valued at \$13,034,209, of which 38 per cent was produced in Quebec and 53 per cent came from Ontario.

THE PROVINCES

NOVA SCOTIA with a mineral output valued at \$27,019,367 in 1930 is fifth in importance among the mineral producing provinces of Canada and is now the principal producing province in coal, barytes, diatomite, gypsum, and silica brick. Coal is the most important item in the mineral production of Nova Scotia. This product in 1930 totalled 6,252,552 tons worth \$24,528,860.

NEW BRUNSWICK in 1930 yielded mineral wealth amounting to \$2,383,571 or 0.84 per cent of the total Canadian mineral production. This province is essentially a producer of the non-metallics and during the year shipped or produced coal, gypsum, clay products, stone, lime, natural gas, petroleum, grindstones, manganese ores and sand and gravel. Considerable interest has been recently taken in the prospecting and exploration of copper and nickel deposits located in the coastal zone.

QUEBEC has, during the past few years, attained a position of prominence among the mineral producing provinces of Canada. In 1930 the province produced mineral wealth to the value of \$41,215,220; this is 11.1 per cent lower than that of the high record valuation of 1929. Quebec, however, still retains the distinction of being the third most important mineral producing province in Canada. The non-metallic mineral production, largely comprised of asbestos, has, until recent years, been much greater than that of the metals. This difference is now greatly reduced through an increased production in copper, gold, zinc and silver. Value of production gains over 1929 were made in the metal and fuel groups and by sand, gravel, and stone in the structural materials. Rather severe losses suffered in the production of other non-metallics and clay products more than offset the recorded increases. The copper production at 80,310,363 pounds establishes a new high record for the output of this metal in Quebec.

ONTARIO, with a wide variety of economic ore deposits, especially those of the mining camps of Sudbury, Porcupine and Kirkland Lake, is endowed with an abundance of mineral resources; resources whose intense and successful development during the past few years was reflected by the general stability of the industry during the economic depression of 1930. The total value of mineral production for the year amounted to \$113,530,976 as against \$117,662,505 in 1929. Losses were experienced in all the major groups with the exception of the fuels. Valuation by groups gives metallics, \$83,362,846; fuels, \$5,272,176; other non-metallics, \$3,083,391; clay products, \$5,221,214; and other structural materials, including cement, lime, sand and gravel, and stone, \$16,591,349. Ontario produced 40.57 per cent of the Dominion's total mineral output in 1930 and retains its position as the premier producing province in the mining industry of Canada.

MANITOBA'S mines and associated mineral industries yielded in 1930 mineral wealth valued at \$5,453,182. Copper production, largely from the Flin Flon smelter, of the Hudson Bay Mining and Smelting Company, Ltd., operated for the first time in 1930, amounted to 2,087,609 pounds valued at \$215,018. The total output of metals with a value of \$870,248 was considerably greater than in 1929. Decreases occurred in the production of non-metallics and clay products. Structural materials, other than clay products, were valued at \$4,068,490, an increase of \$139,333 over the 1929 output; sand, gravel and stone productions represented the individual gains in this group.

SASKATCHEWAN produces no metalliferous ores; the mineral production of this province comes almost entirely from operations in the coal, clay, structural material and natural salts industries. In 1930 the value of coal produced was \$968,863 as compared with \$993,226 in 1929. The total value of the Saskatchewan mineral production for the year totalled \$2,368,612 representing a

gain of 4.1 per cent over that for the previous year; sodium sulphate shipments were valued at \$293,847, a large increase over 1929. This increase resulted from the growing consumption of this mineral in the metallurgical treatment of copper-nickel ores at Sudbury, Ontario. Clay products were valued at \$349,283 and a 3,680,553 tonnage of sand and gravel possessed a valuation of \$751,779.

ALBERTA in 1930 had a total mineral production valued at \$30,427,742. This is a decrease of \$4,312,244 from the 1929 valuation. Alberta is the leading fuel producing province in Canada, during 1930 the value of coal amounted to \$18,063,225; natural gas, \$4,929,226, and petroleum, \$4,780,696. Oil and gas wells, especially in the southern sections of the province, are important contributors to the mineral production of Alberta. Technical research as to the economic importance of the very extensive deposits of bituminous sands in the Fort McMurray district, was continued in 1930.

BRITISH COLUMBIA, second in importance among the mineral producing provinces of Canada, produced in 1930 minerals valued at \$54,953,320. This is a decrease of 19.3 per cent from the value of the preceding year; of the combined Canadian mineral yield, British Columbia contributed 30.7 per cent of the copper, 44.7 per cent of the silver, 7.8 per cent of the gold, 96.7 per cent of the lead, and 93.6 per cent of the zinc. Included in the wide variety of metals, minerals and substances of mineral origin produced in this province are: arsenic, cadmium, palladium, platinum, diatomite, grindstones, gypsum, iron oxides, quartz, sodium carbonate, pyrites, talc and various clay products and other structural materials. British Columbia is the third most important coal producing province in Canada. This mineral is mined on Vancouver Island, along the Crowsnest Pass, and in other parts of the interior. In the Trail plants of the Consolidated Mining and Smelting Company, Canada possesses one of the largest and most efficiently equipped metallurgical institutions in the world; a superphosphate fertilizer unit is one of the more recent additions to this great industrial development.

Mineral production in the Yukon during 1930 was confined to gold, lead, silver, copper and coal; this output valued at \$2,521,588 was \$384,148 less than in the previous year. Gold was recovered from alluvial deposits and the silver-lead production resulted from smelter treatment of concentrates shipped by mines in the Mayo district. Two companies operating five dredges and many individuals and miners working in partnership were engaged in placer mining and experienced a successful season. The Yukon Territory contains 2,840 square miles of coal lands with an estimated probable reserve of 250,000,000 tons of bituminous and 4,690,000,000 tons of lignite coal.

Franklin, Keewatin and MacKenzie, constituting the Northwest Territories of Canada, and exclusive of Hudson and Ungava Bays, comprise an area of 1,309,682 square miles, or greater than that of British India. Metal bearing ore deposits, although little developed, are known to occur in several areas; wells drilled in the vicinity of Fort Norman on the lower MacKenzie are reported to have indicated possibilities of this section becoming a future and possibly important oil producing field. Important deposits of lead-zinc ores are known to exist in the vicinity of Great Slave Lake. During 1930 prospecting and exploration of a preliminary nature were carried out on chalcocite, bornite and native copper deposits occurring in the area southwest of Coronation Gulf, and a deposit of nickel-copper ore located at Ranken Inlet on the west shore of Hudson Bay, was diamond drilled. The nickeliferous ore consists of pyrrhotite with minor amounts of chalcopyrite and traces of pyrite.

Exploration and prospecting in the Territories have been greatly stimulated and advanced through the adoption of aerial transportation. The efficiency of this mode of travel is strongly emphasized in the enormous amount of reconnaissance accomplished as in contrast with the slower and laborious methods by canoe and pack horse.

INDUSTRIAL REVIEW

The capital employed in Canadian mines in 1930 amounted to \$887,420,859, of which \$427,439,265 was invested in metal mining and metallurgical works; \$274,164,992 in coal mines and oil and gas wells; \$54,611,604 in other non-metal mining enterprises such as asbestos, feldspar, graphite, etc.; \$33,430,777 in the clay products industry; and \$97,774,221 in the production of cement, lime, sand and gravel, and stone.

Capital invested in coal and auriferous quartz mining amounted to 29·31 per cent of the total employed in the Canadian mining industry; metallurgical works represent 19·72 per cent; natural gas 7·95 per cent; cement manufacture 6·67 per cent; clay products approximately 3·77 per cent, and stone quarrying 2·50 per cent. Ontario's mining industry accounts for 36·78 per cent of the total capital investment in this industry. For the other provinces relative capital investments in mining expressed in percentages of the total for Canada were as follows: British Columbia, 16·93 per cent; Quebec, 15·81 per cent; Alberta, 16·90 per cent; Nova Scotia, 7·36 per cent; Manitoba, 4·04 per cent; the remaining percentage represented wealth invested in the provinces of New Brunswick, Saskatchewan and the Yukon Territory.

Salaries and wages paid to 89,200 employees amounted to \$113,975,332, of which \$48,851,303 was distributed among 30,623 individuals in metal mining and metallurgical works; 38,355 people employed in oil and gas fields, coal and other non-metal mines received \$47,852,675 and clay products and other structural materials industries engaged 20,222 employees and distributed \$17,271,354 in salaries and wages. The metal mining and metallurgical group showed a marked and steady increase in employment from 1924 until 1929. In 1930, however, certain sections of these groups together with some branches in the clay products and other non-metallic mining industries suffered considerable decreases in employment as compared to 1929.

The total cost of fuel and electricity used in the mining industry in Canada was \$25,066,193. This figure does not include the coke used in non-ferrous smelting furnaces which amounted to \$3,262,541 in 1930.

Products of the mines, smelters, quarries, sand and gravel pits, oil and gas wells, clay products plants, cement mills, and other mineral industries, in Canada during 1930 possessed a net value of \$270,785,513 as against \$315,181,388 in 1929 and \$190,845,547 in 1924. These figures must not be confused with the figures given as the value of mineral production; in calculating the mineral production values the metals recovered from Canadian ores are valued at average annual prices for these metals in recognized world markets. The figures given above, however, represent the actual net return to the mines or metallurgical works regardless of the metal content of the consignments or the distance that the ore and other products must be shipped.

IMPORTS AND EXPORTS.—Imports into Canada during the calendar year 1930 of minerals and allied products reached a value of \$493,628,796 as compared with \$659,219,678 in 1929. These consisted of iron and its products valued at \$225,068,051, non-ferrous metals and products worth \$66,926,975; non-metallic minerals and their products valued at \$164,848,720, and chemicals and allied products worth \$36,785,050. In the previous year imports of iron and its products were valued at \$342,480,427; non-ferrous metals, \$90,686,274; non-metallic minerals, \$185,921,799; and chemicals and allied products, \$40,131,178. Exports of similar products during the same period had a value of \$202,514,838 as compared with \$289,813,395 in 1929. The 1930 exports of iron and its products were valued at \$47,565,525 as against \$90,101,565 in the previous year; non-ferrous metals \$115,766,626 as against \$148,164,138; non-metallic minerals, \$22,685,197 as against \$29,559,453 and chemicals and allied products, \$16,497,490 as compared with \$21,988,239 during the year ending December 31, 1929.

An analysis of Canada's external trade in these four groups during 1930 shows that the value of imports from the United States amounted to \$403,720,396 or 82 per cent of the total imported from all foreign sources; \$44,478,165, or 9 per cent of the value of purchases represented goods from the United Kingdom, and the remainder was derived from other countries, chief among which were: Belgium, France, Sweden, Germany, Czecho-Slovakia and Japan.

Of the total exports of these same groups, \$104,110,111, or 51·5 per cent went to the United States and \$58,356,545 or 56 per cent to the British Empire. Of the latter, the United Kingdom, Australia, New Zealand, South Africa and India, were the largest purchasers. Among the remaining countries the largest importers were Argentina, Belgium, Dutch East Indies, France, Germany, Japan, Netherlands, Russia, Peru and Mexico.

The largest items among Canada's exports of iron and its products in 1930 were automobiles and automobile parts valued at \$20,000,000 as compared with \$47,000,000 in 1929 and farm implements at \$10,000,000 as against \$20,000,000 during the preceding year; among the non-ferrous metals, gold and silver, in the form of bullion and in ore, were valued at nearly \$32,000,000; nickel in its various forms, \$20,000,000; pig lead and lead in ore, \$8,300,000; copper in blister form, in ores exported, bars, rods, wire, scrap, etc., \$31,400,000; zinc spelter, scrap, etc., \$6,250,000; and aluminium in bars, blocks, scrap and in manufactured form, \$10,000,000.

Among the exports of the non-metallic mineral products, asbestos ranked first with a valuation of \$8,600,000; coal exports amounted to \$3,300,000; artificial abrasives totalled nearly \$3,000,000; crude petroleum was appraised at \$880,000, and gypsum exports for the year possessed a value of \$870,000.

The more important items exported in the chemicals and allied products group were cyanamide at \$5,000,000; acids, \$2,816,000; soda and sodium compounds, \$3,100,000; cobalt oxides and salts, \$632,000 and ammonium sulphate, \$387,000.

PRICES.—The Bureau's index number for articles of mineral origin, raw and partly manufactured, indicated much lower price levels generally as compared with the base (1926=100). In January and February, 1930, the index for this group was 92·2; in March, 90·4; in April, 89·5; and from 85·6 in May the index fluctuated monthly to 81·7 at the close of the year. Greatly reduced prices for copper, lead, tin, and zinc largely accounted for the decrease in the index for non-ferrous metals and their products from 92·2 in 1929 to 80·7 in 1930; in the non-metallic minerals and products a decrease from 92·9 in 1929 to 91·3 in 1930 was due largely to lower prices for asbestos and crude petroleum. Silver averaged 38·1 cents per ounce, a low record for this metal; copper fell from 18 cents per pound in 1929 to 13 cents in 1930; London prices averaged 3·92 cents for lead and 3·6 cents for zinc as compared with 5·04 cents and 5·38 cents respectively in 1929; nickel maintained a price which has remained approximately constant for some years.

Table 4.—Exchange Table Showing Average Monthly Quotations for New York Funds at Montreal, 1926-1930

Month	1926	1927	1928	1929	1930
	\$	\$	\$	\$	\$
January.....	1-0020	1-0016	1-0018	1-0027	1-0134
February.....	1-0034	1-0016	1-0019	1-0038	1-0060
March.....	1-0037	1-0037	1-0000	1-0060	1-0021
April.....	0-9996	0-9990	0-9997	1-0076	1-0004
May.....	0-9992	0-9993	1-0009	1-0068	1-0017
June.....	0-9989	1-0003	1-0024	1-0083	1-0000
July.....	0-9987	1-0015	1-0021	1-0049	0-9914
August.....	0-9985	1-0006	1-0000	1-0056	0-9990
September.....	0-9986	0-9995	0-9996	1-0076	0-9984
October.....	0-9993	0-9989	1-0003	1-0144	0-9989
November.....	0-9986	0-9986	0-9999	1-0157	0-9989
December.....	1-0006	1-0010	1-0021	1-0078	1-0023
Average.....	1-0001	1-0005	1-0009	1-0076	1-0049

Table 5.—Metal Prices, 1926-1930

Commodity	Market	Unit	1926	1927	1928	1929	1930
			\$	\$	\$	\$	\$
Antimony (ordinaries).....	New York.....	Pound.....	0-15988	0-12393	0-10305	0-08956	0-07667
Arsenic, white.....	New York.....	Pound.....	0-0350	0-0383	0-04	0-04	0-04
Cobalt.....	New York.....	Pound.....	2-50	2-50	2-63	2-52	2-50
Cobalt oxide.....	New York.....	Pound.....	2-10	2-10	2-10	2-10	2-00
Copper.....	New York.....	Pound.....	0-13795	0-12920	0-14570	0-18107	0-12982
	Montreal.....	Pound.....	0-1577	0-1478	0-16402	0-1 978	0-1498
	New York.....	Pound.....	0-08417	0-06755	0-06305	0-06833	0-05517
Lead.....	Montreal.....	Pound.....	0-08154	0-0673	0-0606	0-06678	0-05496
	Toronto.....	Pound.....	0-08274	0-0683	0-06206	0-06775	0-056
	London.....	Pound.....	0-06751	0-05256	0-04576	0-05054	0-03927
Nickel.....	New York.....	Pound.....	0-36	0-36	0-36	0-35	0-36
Platinum.....	New York.....	Ounce.....	113-269	84-636	78-580	67-655	45-358
Silver.....	New York.....	Ounce.....	0-62107	0-56370	0-58176	0-52993	0-38154
Tin*.....	New York.....	Pound.....	0-63615	0-62747	0-50427	0-45155	0-31694
	St. Louis.....	Pound.....	0-07337	0-06242	0-06027	0-06512	0-04556
Zinc.....	Montreal.....	Pound.....	0-08825	0-07710	0-07144	0-0687	0-05084
	London.....	Pound.....	0-07410	0-06194	0-05493	0-05386	0-03600

* Year 1926 prices for 99% grade; years 1927-30 prices for Straits.

Table 6.—Average Prices of the Principal Metals, 1899-1930 (a)

Year	Copper		Lead			Tin	
	Electrolytic	Standard	New York	St. Louis	London	(f)	(b)
	New York	London				New York	London
1899.....	16-670	73-687	4-470	4-340	14-933	25-120	122-429
1900.....	16-190	73-625	4-370	4-240	16-987	29-900	133-575
1901.....	16-110	66-983	4-330	4-200	12-521	26-740	118-633
1902.....	11-626	52-460	4-069	3-939	11-262	26-790	129-720
1903.....	13-235	57-970	4-237	4-107	11-579	28-090	137-330
1904.....	12-823	58-884	4-309	4-179	11-983	27-990	126-733
1905.....	15-590	69-465	4-707	4-577	13-719	31-358	143-083
1906.....	19-278	87-282	5-657	5-527	17-370	39-819	180-646
1907.....	20-004	87-007	5-325	5-195	19-034	38-166	172-638
1908.....	13-208	59-902	4-200	4-070	13-439	29-465	133-124
1909.....	12-982	58-732	4-273	4-153	13-042	29-725	134-774
1910.....	12-738	57-054	4-446	4-312	12-920	34-123	155-308
1911.....	12-376	55-973	4-420	4-286	13-970	42-281	192-353
1912.....	16-341	72-942	4-471	4-360	17-929	46-096	209-420
1913.....	15-269	68-335	4-370	4-238	18-743	44-252	201-679
1914.....	13-602	(c) 61-524	3-862	3-737	(c) 19-076	34-301	(c) 156-564
1915.....	17-275	72-532	4-673	4-567	22-917	38-590	163-960
1916.....	27-202	116-059	6-858	6-777	31-359	43-480	182-096
1917.....	27-180	124-892	8-787	8-721	30-500	61-802	237-565
1918.....	(d) 24-628	115-530	7-413	7-222	30-100	(e)	330-138
1919.....	18-691	90-796	5-759	5-530	28-590	63-328	257-601
1920.....	17-456	97-480	7-957	7-830	37-832	49-101	295-866
1921.....	12-502	69-356	4-545	4-363	22-752	29-162	165-265
1922.....	13-382	62-123	5-734	5-503	24-097	32-554	159-450
1923.....	14-421	65-840	7-267	7-141	27-147	42-664	202-148
1924.....	13-024	63-149	8-097	7-969	34-421	50-176	248-737
1925.....	14-042	61-920	9-020	8-817	36-429	57-893	260-974
1926.....	13-795	57-971	8-417	8-223	31-075	65-285	291-016
1927.....	12-920	55-653	6-755	6-511	24-192	64-353	288-953
1928.....	14-570	63-703	6-305	6-131	21-060	50-427	227-131
1929.....	18-107	75-416	6-833	6-660	23-246	45-155	203-850
1930*.....	12-982	54-611	5-517	5-384	18-077	31-694	141-873

Year	Zinc		Antimony, New York	Quick- silver, New York	Aluminum, New York (g)	Silver, New York	Platinum, New York
	St. Louis	London					
1899.....	5-600	24-858	9-430	43-63	32-72	59-580	15-22
1900.....	4-240	20-274	9-500	51-00	32-72	61-330	18-09
1901.....	3-930	17-029	8-250	47-00	33-00	58-950	20-00
1902.....	4-690	18-545	6-120	48-03	33-00	52-160	19-00
1903.....	5-191	20-970	6-000	41-32	33-00	53-570	18-91
1904.....	4-931	22-591	6-371	41-00	35-00	57-221	19-50
1905.....	5-730	25-433	10-250	38-50	35-00	60-352	20-34
1906.....	6-048	27-020	21-730	40-90	35-75	66-791	28-04
1907.....	5-812	23-771	14-840	41-50	45-00	65-327	30-98
1908.....	4-578	20-163	8-004	44-84	28-70	52-864	16-32
1909.....	5-352	22-185	7-466	46-30	22-00	51-502	24-87
1910.....	5-370	23-050	7-386	47-06	22-25	53-486	32-70
1911.....	5-608	25-281	7-540	46-54	20-07	53-304	43-12
1912.....	6-799	26-421	7-760	42-46	22-01	60-835	45-55
1913.....	5-504	22-746	7-520	39-54	23-64	59-791	44-88
1914.....	5-061	(c) 22-544	8-763	48-31	18-63	54-811	45-14
1915.....	13-054	67-553	30-280	87-01	33-98	49-684	47-13
1916.....	12-634	72-071	25-370	125-49	60-71	65-661	83-40
1917.....	8-730	52-413	20-690	106-30	51-59	81-417	102-82
1918.....	7-890	54-180	12-581	123-47	33-53	96-772	105-95
1919.....	6-988	42-879	8-190	92-15	(e)	111-122	114-61
1920.....	7-671	44-372	8-485	81-12	32-72	100-900	110-90
1921.....	4-655	25-845	4-957	45-46	21-11	62-654	75-03
1922.....	5-716	30-003	5-471	58-95	18-68	67-528	97-62
1923.....	6-607	33-058	7-897	66-50	25-41	64-873	116-54
1924.....	6-344	33-728	10-836	69-76	27-03	66-781	118-82
1925.....	7-622	36-624	17-494	83-13	27-19	69-065	119-09
1926.....	7-337	34-105	15-988	91-90	26-99	62-107	113-27
1927.....	6-242	28-513	12-393	118-16	25-40	56-370	84-64
1928.....	6-027	25-284	10-305	123-51	23-90	58-176	78-58
1929.....	6-512	24-790	8-956	122-15	23-90	52-993	67-66
1930*.....	4-556	16-570	7-667	115-01	23-39	38-154	45-36

(a) Authorities: Metallgesellschaft—London prices of copper, 1899-1901; of zinc, 1899-1904; of tin, 1899-1913. American Metal Market—aluminum, 1922-1930. W. R. Ingalls—St. Louis lead, 1899-1908 and St. Louis zinc, 1899-1901. All other prices from Engineering and Mining Journal or the Mineral Industry. (b) Standard tin. (c) Average of nine months; no quotations during August, September, and October. (d) Average of 11 months; no quotations in December. (e) No average computed. (f) 99 per cent tin 1899-1919; Straits tin, 1920-1930. (g) Refer also to page 130.

Quotations for copper, lead, tin, zinc, antimony, and aluminum, in New York or St. Louis, are in cents per pound. Quicksilver prices are per flask of 75 lb. Silver is quoted in cents per ounce; platinum, dollars per ounce. All London quotations are given in pounds sterling per long ton.

*From 1930 Year Book of the American Bureau of Metal Statistics.

Table 7.—Prices of Non-Metallic Minerals and Structural Materials, 1926-1930, Showing the Average Returns Received by Producers, f.o.b. Shipping Points in Canada as Computed from the Total Receipts and Total Shipments for the Year

Commodity	Unit	1926	1927	1928	1929	1930
		\$	\$	\$	\$	\$
NON-METALLICS						
Actinolite.....	Ton.....	12-50	12-50	12-50	12-50	12-85
Asbestos.....	Ton.....	36-14	38-65	41-16	43-03	34-65
Barytes.....	Ton.....	23-07	22-64	22-41	22-29	22-48
Bituminous sands.....	Ton.....	4-00	4-00	4-00	4-00	4-00
Coal.....	Ton.....	3-63	3-55	3-63	3-60	3-55
Diatomite.....	Ton.....		25-00	24-34	24-07	23-91
Feldspar.....	Ton.....	8-63	8-68	8-96	9-07	10-02
Fluorspar.....	Ton.....				15-05	15-05
Garnets.....	Ton.....		75-00			
Graphite.....	Ton.....	71-45	61-04	52-00	70-61	62-80
Grinding pebbles.....	Ton.....	9-00				
Grindstones.....	Ton.....	56-11	55-53	54-42	54-62	74-72
Gypsum.....	Ton.....	3-13	3-06	3-00	2-76	2-63
Iron Oxides.....	Ton.....	15-37	16-90	20-54	17-78	12-72
Magnesite.....	Ton.....	30-07	31-39	26-37	26-11	25-21
Magnesium sulphate.....	Ton.....					
Manganese, Bog.....	Ton.....			5-81	6-08	6-00
Mica (rough cobbled).....	Pound.....	0-04	0-03	0-01	0-01	82-05
Mineral water.....	Gal.....	0-14	0-04	0-12	0-05	0-11
Natro-alumite.....	Ton.....		35-43			
Natural gas.....	M cu. ft.....	0-39	0-38	0-38		0-35
Peat.....	Ton.....			3-90	0-35	0-35
Petroleum, crude.....	Brl.....		3-13	3-26	3-34	3-84
Phosphate.....	Ton.....	20-00	11-37	12-90	4-54	19-00
Pyrites.....	Ton.....	3-58	3-90			
Quartz.....	Ton.....	2-38	2-12	1-85	1-11	1-85
Salt.....	Ton.....	5-63	6-00	4-99	4-77	6-24
Silica brick.....	M.....		44-40	48-23	43-93	40-27
Sodium carbonate.....	Ton.....	9-02	12-41	9-48	13-47	12-50
Sodium sulphate.....	Ton.....	2-00	2-00	11-43	12-7	9-31
Sulphur.....	Ton.....			8-32	8-20	8-34
Talc.....	Ton.....	13-77	14-29	12-00	11-68	11-49
Volcanic dust.....	Ton.....	7-00	7-00	20-19	20-00	20-00
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement, portland and puzzolan.....	Brl.....	1-49	1-43	1-51	1-57	1-61
Clay products—						
Brick, face.....	Soft mud process.....	M.....	19-71	20-67	19-95	20-21
Brick, common.....		M.....	14-65	16-44	14-25	15-44
Brick, face.....	Stiff mud process, wire cut.....	M.....	21-24	21-19	22-09	21-64
Brick, common.....		M.....	17-26	14-90	15-11	14-68
Brick, face.....	Dry press.....	M.....	21-40	20-96	20-45	21-07
Brick, common.....		M.....	13-40	12-79	13-87	14-08
Brick, fancy or ornamental.....	M.....	52-07	47-37	48-01	68-42	81-56
Brick, sewer.....	M.....	17-90	19-15	20-43	20-27	19-03
Firebrick.....	M.....	45-83	45-70	47-46	48-31	46-87
Fireclay.....	Ton.....	9-25	7-08	6-88	6-98	9-05
Hollow blocks.....	Ton.....	9-25	9-45	9-40	9-98	10-09
Floor tile.....	Sq. ft.....	0-22	0-24	0-26	0-23	0-31
Kaolin.....	Ton.....			5-00		
Paving brick.....	M.....	41-10	42-12	13-20	39-62	33-00
Roofing tile.....	No.....	0-09	0-07	0-03	0-13	0-12
Sewer pipe.....	Ton.....	19-48	19-10			
Tile, drain.....	M.....	27-77	26-86	28-99	28-81	27-17
Lime.....	Bush.....	0-32	0-30	0-31	0-31	8-23
Sand and gravel.....	Ton.....	0-28	0-26	0-21	0-26	0-29
Stone—						
Granite.....	Ton.....	1-48	1-89	1-93	1-78	1-82
Limestone.....	Ton.....	1-07	1-10	1-04	1-05	1-04
Marble.....	Ton.....	98-50	96-57	53-48	29-55	31-03
Sandstone.....	Ton.....	2-54	1-75	2-21	2-50	2-00

Table 8.—Annual Values of the Mineral Production of Canada, 1886-1930

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1886.....	10,221,255	2.23	1909.....	91,831,441	13.70
1887.....	10,321,331	2.23	1910.....	106,823,623	14.93
1888.....	12,518,894	2.67	1911.....	103,220,994	14.32
1889.....	14,013,113	2.96	1912.....	135,048,296	18.33
1890.....	16,763,353	3.50	1913.....	145,634,812	19.35
1891.....	18,976,616	3.92	1914.....	128,863,075	16.75
1892.....	16,623,415	3.39	1915.....	137,109,171	17.44
1893.....	20,035,082	4.04	1916.....	177,201,534	22.05
1894.....	19,931,158	3.98	1917.....	189,646,821	23.18
1895.....	20,505,917	4.05	1918.....	211,301,897	25.37
1896.....	22,474,256	4.38	1919.....	176,686,390	20.84
1897.....	28,485,023	5.49	1920.....	227,859,665	26.40
1898.....	38,412,431	7.32	1921.....	171,923,342	19.56
1899.....	49,234,005	9.27	1922.....	184,297,242	20.55
1900.....	64,470,877	12.04	1923.....	214,079,331	23.41
1901.....	65,797,911	12.16	1924.....	209,533,406	22.71
1902.....	63,231,836	11.36	1925.....	226,583,333	24.19
1903.....	61,740,513	10.83	1926.....	240,437,123	25.61
1904.....	60,082,771	10.27	1927.....	247,356,695	25.99
1905.....	69,078,999	11.49	1928.....	274,989,487	28.07
1906.....	79,286,697	12.81	1929.....	310,859,246	31.28
1907.....	86,865,202	13.75	1930.....	279,873,578	27.65
1908.....	85,557,101	13.16			

Table 9.—Annual Values of the Mineral Production of Canada by Classes, 1907-1930 and by Provinces for 1930

Year	Metallics	Non-metallies including fuels	Clay products and other structural materials	Total
	\$	\$	\$	\$
Canada—				
1907.....	42,426,607	31,275,546	12,863,049	(a)86,865,202
1908.....	41,774,362	32,142,784	11,339,955	(a)85,557,101
1909.....	44,156,841	31,141,251	16,533,349	91,831,441
1910.....	49,438,873	37,757,158	19,627,592	106,823,623
1911.....	46,105,423	34,405,960	22,709,611	103,220,994
1912.....	61,172,753	45,080,674	28,694,869	135,048,296
1913.....	66,361,351	48,463,706	30,809,752	145,634,812
1914.....	59,386,619	43,467,229	26,009,227	128,863,075
1915.....	75,814,841	43,873,571	17,920,759	137,109,171
1916.....	106,319,365	53,414,983	17,467,186	177,201,534
1917.....	106,455,147	63,354,363	19,837,311	189,646,821
1918.....	114,549,152	77,621,946	19,130,799	211,301,897
1919.....	73,262,793	76,002,087	27,421,510	176,686,390
1920.....	77,930,630	108,027,947	41,892,088	227,859,665
1921.....	49,343,232	87,842,652	34,737,428	171,923,342
1922.....	61,735,707	82,976,794	39,534,741	184,297,242
1923.....	84,391,218	91,936,732	37,751,381	214,079,331
1924.....	102,406,528	71,796,009	35,380,869	209,533,406
1925.....	117,082,298	71,851,801	37,649,234	226,583,333
1926.....	115,237,581	85,240,144	39,959,398	240,437,123
1927.....	113,561,030	88,986,246	44,809,419	247,356,695
1928.....	132,012,454	93,239,852	49,737,181	274,989,487
1929.....	154,454,056	97,861,356	58,534,834	310,859,246
1930.....	142,743,764	83,402,349	53,727,465	279,873,578
By Provinces—1930—				
Nova Scotia.....	26,381	25,753,680	1,239,306	27,019,367
New Brunswick.....	1,296	1,758,263	624,012	2,383,571
Quebec.....	13,926,372	9,322,150	17,966,698	41,215,220
Ontario.....	83,362,846	8,355,567	21,812,563	113,530,976
Manitoba.....	870,248	298,477	4,284,457	5,453,182
Saskatchewan.....		1,267,550	1,101,062	2,368,612
Alberta.....		27,781,415	2,646,327	30,427,742
British Columbia.....	42,038,143	8,862,137	4,053,040	54,953,320
Yukon Territory.....	2,518,478	3,110		2,521,588
Canada.....	142,743,764	83,402,349	53,727,465	279,873,578

(a) Total includes \$300,000 allowed for products not reported.

Table 10.—Values of the Mineral Production of Canada by Provinces, 1899-1930

Year	Nova Scotia*	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1899	6,817,274	420,227	2,585,635	9,819,557		17,108,707		12,482,605	Included with Manitoba
1900	9,298,479	439,060	3,292,389	11,258,099		23,452,330		16,680,526	
1901	7,770,169	467,985	3,759,984	13,970,010		19,297,940		20,531,833	
1902	10,686,549	607,129	3,743,636	14,619,091		16,127,400		17,448,031	
1903	11,431,914	580,495	3,585,938	14,160,033		14,082,986		17,890,147	
1904	11,212,746	559,913	3,688,482	12,582,843		12,713,613		19,325,174	
1905	11,507,047	559,035	4,405,975	18,633,292		11,387,642		22,386,008	
1906	12,894,303	646,328	5,242,055	25,111,682		10,092,726		25,299,600	Alberta
1907	14,532,040	664,467	6,205,553	30,381,638	898,775	533,251	4,657,524	25,656,056	3,335,898
1908	14,487,108	579,816	6,372,949	30,623,812	584,374	413,212	5,122,505	23,704,035	3,669,290
1909	12,504,810	657,035	7,086,265	37,374,577	1,193,377	456,246	6,047,447	22,479,005	4,032,678
1910	14,195,780	581,942	8,270,136	43,538,078	1,500,359	498,122	8,996,210	24,478,572	4,764,474
1911	15,409,397	612,830	9,304,717	42,796,162	1,791,772	636,706	6,662,673	21,299,305	4,707,432
1912	18,922,236	771,004	11,656,998	51,985,876	2,463,074	1,165,642	12,073,589	30,076,635	5,933,242
1913	19,376,183	1,102,613	13,475,534	59,167,749	2,214,496	881,142	15,054,046	28,086,312	6,276,737
1914	17,584,639	1,014,570	11,836,929	53,034,677	2,413,489	712,313	12,684,234	24,164,039	5,418,185
1915	18,088,342	903,467	11,619,275	61,071,287	1,318,387	451,933	9,909,347	28,689,425	5,057,708
1916	20,042,262	1,118,187	14,406,598	80,461,323	1,823,576	590,473	13,207,543	39,969,962	5,491,610
1917	21,104,542	1,435,024	17,400,077	99,066,600	2,628,264	860,651	16,527,535	36,141,926	4,482,202
1918	22,317,108	2,144,017	19,605,347	94,694,093	3,120,600	1,019,781	23,109,987	42,935,333	2,355,631
1919	23,445,215	1,770,945	21,267,947	67,917,998	2,868,378	1,521,964	21,087,582	34,865,427	1,940,934
1920	34,130,017	2,491,787	28,886,214	81,715,808	4,223,461	1,837,468	33,586,456	39,411,728	1,576,726
1921	28,912,111	1,901,505	15,157,094	57,356,651	1,934,117	1,114,220	30,562,229	33,230,460	1,754,955
1922	25,923,499	2,263,692	17,647,939	65,866,029	2,258,942	1,255,470	27,872,136	39,423,962	1,785,573
1923	29,648,893	2,462,457	20,308,763	80,825,851	1,768,037	1,047,583	31,287,536	33,757,388	2,972,823
1924	23,820,352	1,969,260	19,136,504	86,398,656	1,534,249	1,128,100	22,344,940	52,298,533	952,812
1925	17,625,612	1,743,858	24,284,527	87,980,436	2,276,759	1,076,392	25,318,866	64,485,242	1,791,641
1926	28,873,792	1,811,104	25,956,193	84,702,296	3,073,528	1,193,394	26,977,027	65,622,976	2,226,813
1927	30,111,221	2,148,535	28,870,403	99,932,992	2,888,912	1,455,225	29,309,223	80,801,170	1,789,014
1928	30,574,392	2,198,919	37,037,420	99,584,718	4,186,853	1,719,461	32,531,416	64,496,351	2,709,957
1929	30,904,453	2,439,072	46,358,285	117,662,505	5,423,825	2,253,506	34,739,986	68,162,878	2,905,736
1930	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182	2,368,612	30,427,742	54,953,320	2,521,518

*Includes a small production from Prince Edward Island.

Table 11.—Percentage of the Total Value of the Mineral Production of Canada Produced by Each Province, 1926-1930

Province	1926	1927	1928	1929	1930
Nova Scotia*	12.01	12.17	11.10	9.94	9.65
New Brunswick	0.75	0.87	0.80	0.79	0.84
Quebec	10.79	11.67	13.47	14.93	14.73
Ontario	35.23	36.38	36.22	37.85	40.57
Manitoba	1.28	1.17	1.52	1.75	1.95
Saskatchewan	0.50	0.59	0.63	0.72	0.85
Alberta	11.22	11.85	11.83	11.17	10.87
British Columbia	27.29	24.58	23.45	21.92	19.64
Yukon	0.93	0.72	0.98	0.93	0.90
Canada	100.00	100.00	100.00	100.00	100.00

*Includes a small percentage from Prince Edward Island.

Table 12.—Mineral Production of Nova Scotia, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Gold..... fine oz.	1,290	26,667	2,687	55,545	1,272	26,295
Silver..... fine oz.	77	45	132	70	67	26
Manganese ore..... tons					4	60
NON-METALLICS—						
Barytes..... tons	127	2,847	105	2,341	66	1,484
Coal..... tons	6,743,504	27,427,556	7,056,133	28,071,956	6,252,552	24,528,860
Diatomite..... tons	208	4,160	254	5,080	398	7,960
Grindstones..... tons			6	110	6	110
Gypsum..... tons	1,013,257	1,850,243	948,895	1,152,160	827,063	982,287
Quartz..... tons	7,424	28,022	11,845	31,388	8,057	18,494
Salt..... tons	19,604	118,342	27,819	157,662	23,058	136,226
Silica brick..... M	1,627	69,179	2,385	93,207	2,040	78,259
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		496,577		653,157		495,333
Lime..... tons	36,154	175,876	42,001	154,187	31,114	113,250
Sand and gravel..... tons	296,266	111,103	332,599	151,368	525,683	810,407
Stone..... tons	121,168	213,775	264,706	376,222	152,463	320,316
Total.....		30,524,392		30,904,453		27,019,367

Table 13.—Mineral Production of New Brunswick, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Manganese ore..... tons					269	1,296
NON-METALLICS—						
Coal..... tons	207,738	869,104	218,706	909,169	209,349	864,118
Grindstones..... tons	1,609	80,451	1,731	103,514	495	35,689
Gypsum..... tons	75,033	501,252	70,482	485,982	82,674	513,677
Manganese, Bog..... tons	385	2,237	300	1,800	275	1,650
Natural gas..... M cu. ft.	660,981	324,344	678,456	333,002	661,975	325,751
Petroleum..... brl.	8,043	21,391	7,499	19,909	6,758	17,378
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		72,192		160,006		162,536
Lime..... tons	11,261	130,784	15,518	174,553	12,521	135,304
Sand and gravel..... tons	491,471	54,183	525,857	46,167	357,551	41,303
Stone..... tons	46,332	142,981	27,352	204,970	111,612	284,869
Total.....		2,198,919		2,439,072		2,383,571

Table 14.—Mineral Production of *Quebec, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Copper..... lb.	33,697,949	4,909,791	55,337,169	10,019,901	80,310,363	10,425,891
Gold..... fine oz.	60,006	1,240,434	90,798	1,876,961	141,747	2,930,170
Titaniferous iron ore, sold for export. tons	2,244	6,732	2,748	7,359	412	1,239
Lead..... lb.	6,218,336	284,520	5,358,304	270,616		
Molybdenite..... lb. (MoS ₂)			16,150	6,400		
Silver..... fine oz.	908,959	528,796	813,821	431,268	571,164	217,922
Zinc..... lb.	21,057,760	1,156,745	19,653,440	1,058,731	9,754,160	351,150
NON-METALLICS—						
Asbestos..... tons	273,033	11,238,360	306,055	13,172,581	242,114	8,390,163
Feldspar..... tons	12,943	104,789	15,790	133,492	17,074	163,802
Graphite..... tons	50	4,668	173	12,652	197	9,850
Iron oxides..... tons	5,278	109,383	6,220	113,932	6,590	83,753
Magnesite..... tons	13,195	346,990	18,809	491,170	13,336	336,162
Mica..... tons	1,101	54,224	1,062	72,630	430	61,729
Mineral water..... Imp. gal.	15,415	5,608	12,205	2,488	12,941	3,727
Peat..... tons			1,607	8,839	2,219	9,330
Phosphate..... tons	91	1,126	40	800	40	760
Pyrites..... tons	†1,552	12,061	†9,926	73,119	†12,653	93,038
Quartz..... tons	64,577	143,067	46,444	132,532	49,561	119,668
Talc and soapstone..... tons		40,171		47,986		50,168
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brl.	4,913,820	6,305,396	5,169,408	7,120,374	4,865,609	7,031,528
Clay products.....		3,097,295		3,187,702		2,464,044
Lime—						
Quicklime..... tons	102,859	795,999	157,714	1,183,148	117,358	874,077
Hydrated lime..... tons	11,271	100,783	9,478	81,046	11,992	93,573
Sand and gravel..... tons	8,136,341	1,701,282	6,203,231	1,534,699	6,581,807	1,750,690
Stone..... tons	2,992,192	4,849,200	3,484,471	5,317,859	3,818,126	5,752,786
Total.....		37,037,420		46,358,285		41,215,220

* There is also in this province an important production of aluminium from imported ores.

†Sulphur content of pyrites.

Table 15.—Mineral Production of *Ontario, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃)..... lb.	4,097,226	178,149	3,742,913	154,887	2,750,887	109,932
Bismuth..... lb.	14,002	5,067	27,446	23,413	12,732	6,366
Cobalt..... lb.	954,860	1,671,900	929,415	1,801,915	694,163	1,144,007
Copper..... lb.	66,607,510	8,770,149	88,879,853	14,622,572	127,718,871	15,187,259
Gold..... fine oz.	1,578,434	32,629,126	1,622,267	33,535,234	1,736,012	35,886,552
Lead..... lb.	6,814,757	402,289	4,769,506	294,431	2,193,856	116,034
Nickel..... lb.	96,755,578	22,318,907	110,275,912	27,115,461	103,768,857	24,455,133
Palladium, Rhodium, etc..... fine oz.	13,087	605,563	17,141	802,453	34,040	894,511
Platinum..... fine oz.	10,452	704,360	12,474	843,928	34,000	1,542,172
Silver..... fine oz.	7,242,601	4,213,456	8,890,726	4,711,462	10,205,683	3,893,876
Zinc..... lb.	58,724	3,226	5,516,806	297,190	3,527,894	127,004
NON-METALLICS—						
Actinolite..... tons	70	875	30	375	34	437
Beryl Crystals..... lb.			4,456	114		
Diatomite..... tons					10	140
Eldspar..... tons	18,954	180,153	21,737	206,979	9,722	104,667
Fluorspar..... tons			70	1,120	80	1,240
Graphite..... tons	1,047	52,373	1,288	90,522	1,338	86,542
Gypsum..... tons	85,811	553,271	100,347	832,689	94,946	776,069
Mica..... tons	2,559	32,944	2,991	45,919	740	34,275
Mineral water..... Imp. gal.	253,630	27,890	309,700	13,651	214,200	20,754
Natural gas..... M cu. ft.	7,632,800	4,535,312	8,586,475	4,959,695	7,965,761	5,034,828
Peat..... tons	1,497	5,845	1,000	4,500	628	1,602
Petroleum..... bbl.	134,094	249,737	121,194	253,678	117,302	235,746
Pyrites..... tons	14,974	54,100	† 4,579	51,516	17,277	73,855
Quartz..... tons	194,503	308,608	187,973	316,050	167,487	274,674
Salt..... tons	279,841	1,377,629	302,445	1,420,424	248,637	1,558,405
Silica brick..... M	1,597	86,323	1,566	80,374	378	19,120
Talc and soapstone..... tons	14,925	179,187	15,463	180,492	11,664	133,213
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... bbl.	3,911,795	5,520,897	4,624,712	6,608,246	3,942,690	5,779,404
Clay products.....		6,177,664		6,830,162		5,221,214
Line—						
Quicklime..... tons	228,101	1,870,476	314,243	2,624,284	209,340	1,673,409
Hydrated..... tons	49,085	597,367	55,915	740,127	42,726	504,178
Sand and gravel..... tons	10,389,408	2,230,307	11,358,568	3,462,379	12,027,082	3,783,830
Stone..... tons	4,581,929	4,041,568	5,239,672	4,736,263	5,396,233	4,850,528
Total.....		99,584,718		117,662,505		113,530,976

* The total production of blast-furnace pig-iron in Ontario in 1928 was 734,971 long tons valued at \$14,427,481; in 1929 it was 769,359 long tons valued at \$15,387,180 and in 1930 it was 534,642 long tons valued at \$10,690,840.

† Sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making.

Table 16.—Mineral Production of Manitoba, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Copper..... lb.					2,087,609	215,018
Gold..... fine oz.	19,813	409,571	22,455	464,186	23,189	479,359
Silver..... fine oz.	1,763	1,026	2,644	1,401	94,653	36,114
Zinc..... lb.					3,882,141	139,757
NON-METALLICS—						
Gypsum..... tons	51,285	609,039	67,269	631,051		
Natural gas..... M cu. ft.	200	60	600	180	34,157	298,297
Quartz..... tons	*1	360			600	180
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... bbl.	693,450	1,685,084	1,000,258	2,350,606	977,906	2,268,742
Clay products.....		291,791		362,240		215,967
Lime..... tons	28,337	319,699	32,246	361,104	24,098	260,325
Sand and gravel..... tons	1,653,929	262,006	1,782,085	322,430	1,253,103	453,944
Stone..... tons	235,864	608,217	192,109	895,017	147,078	1,085,479
Total.....		4,186,853		5,423,825		5,453,182

* Rose quartz.

Table 17.—Mineral Production of Saskatchewan, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
NON-METALLICS—						
Coal..... tons	471,713	831,491	580,189	993,226	579,424	968,863
Sodium sulphate..... tons	6,016	68,804	5,018	64,112	31,571	293,847
Volcanic dust..... tons	485	9,795	300	6,000	242	4,840
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		377,896		502,522		349,283
Sand and gravel..... tons	2,225,524	431,475	3,496,679	687,646	3,680,553	751,779
Total.....		1,719,461		2,253,506		2,368,612

Table 18.—Mineral Production of Alberta, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold..... fine oz.	68	1,406	5	103		
Silver..... fine oz.	7	4				
NON-METALLICS—						
Bituminous sands..... tons	94	374	989	3,956	2,067	8,268
Coal..... tons	7,336,330	23,532,414	7,150,693	22,928,182	5,755,528	18,063,225
Natural gas..... M cu. ft.	14,288,605	3,754,466	19,112,931	4,684,247	20,748,583	4,929,226
Petroleum..... brl.	482,047	1,764,172	988,675	3,458,177	1,398,160	4,780,696
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brl.	834,067	1,732,582	808,796	1,770,786	525,289	1,144,160
Clay products.....		1,162,264		1,342,427		997,685
Lime..... tons	6,672	69,588	7,681	79,569	5,136	49,525
Sand and gravel..... tons	2,575,708	489,406	1,721,930	447,993	1,626,989	433,221
Stone..... tons	5,010	24,740	5,183	24,546	7,903	21,736
Total.....		32,531,416		34,739,986		30,427,742

Table 19.—Mineral Production of British Columbia, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic..... lb.	1,334,997	14,903	1,487,175	16,433	1,773,333	19,595
Bismuth..... lb.			166,883	283,701		
Cadmium..... lb.	491,894	341,374	773,976	675,294		337,871
Chromite..... tons			126	900		
Cobalt..... lb.	1,730	420				
Copper..... lb.	102,283,210	14,902,664	103,903,738	18,772,778	93,318,885	12,114,657
Gold..... fine oz.	196,617	4,064,434	154,204	3,187,680	164,331	3,397,023
Lead..... lb.	317,722,146	14,537,377	307,999,153	15,555,189	321,803,725	12,637,232
Palladium, Rhodium, etc..... fine oz.	520	22,270	177	6,836	52	1,356
Platinum..... fine oz.	80	4,549	45	2,828	24	1,089
Silver..... fine oz.	10,943,367	6,366,413	10,156,408	5,382,185	11,825,930	4,512,065
Zinc..... lb.	163,530,890	8,983,079	172,096,841	9,270,857	250,479,310	9,017,255
Non-METALLICS—						
Coal..... tons	2,804,594	11,094,353	2,490,378	10,160,789	2,083,818	8,421,572
Diatomite..... tons	160	4,800	175	5,250	146	5,147
Fluorspar..... tons			17,800	267,000		
Grindstones, pulpstones..... tons	246	20,509	210	2,730	329	26,222
Gypsum..... tons	20,982	229,843	24,696	243,814	32,128	248,458
Iron oxides..... tons	136	1,815	298	2,000	6	120
Manganese, bog..... tons			1	30		
Phosphate..... tons	550	7,150	1,145	4,580		
Pyrites..... tons	*32,063	254,872	*28,276	226,208	*17,800	147,942
Quartz..... tons	16,017	43,876	9,642	45,947	1,095	5,291
Sodium carbonate..... tons	519	4,922	600	8,100	364	4,550
Talc..... tons			46	720	177	2,835
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brl.	670,796	1,495,204	680,907	1,487,223	721,044	1,489,233
Clay products.....		706,039		866,427		687,516
Lime—						
Quicklime..... tons	24,512	345,131	26,300	355,013	27,104	251,479
Hydrated..... tons	10,637	128,865	13,291	155,579	9,413	83,578
Sand and gravel..... tons	2,334,270	529,669	2,425,996	665,132	2,494,743	819,739
Slate..... tons					150	3,000
Stone..... tons	271,439	391,820	408,931	511,655	361,091	718,495
Total.....		64,496,351		68,162,878		54,953,320

*Sulphur content.

Table 20.—Mineral Production of the Yukon, 1928-1930

Product	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Copper..... lb.	107,377	15,645			42,628	5,534
Gold..... fine oz.	34,364	710,367	35,892	741,954	35,517	734,202
Lead..... lb.	7,191,449	329,045	8,395,603	424,012	8,896,582	349,369
Silver..... fine oz.	2,839,633	1,651,985	3,279,530	1,737,922	3,746,326	1,429,373
Non-METALLICS—						
Coal..... tons	414	2,915	458	1,848	653	3,110
Total.....		2,709,957		2,905,736		2,521,588

Table 21.—Principal Statistics of the Mineral Industry in Canada by Industries, 1926-1930

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
Metal Mining Industry							
ALLUVIAL GOLD							
1926.....	108	1,179	4,702,808	285	339,841	44,482	879,886
1927.....	94	96	9,653,723	321	472,596	30,834	794,033
1928.....	82	82	10,384,575	342	538,270	57,178	852,735
1929.....	68	68	7,237,850	488	586,193	2,969	836,006
1930.....	79	79	5,881,620	394	612,369	8,272	877,778
AURIFEROUS QUARTZ							
1926.....	60	60	103,945,022	7,663	12,340,623	2,083,811	35,171,561
1927.....	72	76	118,381,468	8,022	12,935,719	2,222,085	37,452,995
1928.....	98	100	147,693,710	9,066	14,615,990	2,554,657	36,655,330
1929.....	80	85	135,166,105	8,660	14,258,733	2,579,481	37,275,986
1930.....	54	56	119,758,057	8,401	14,034,620	2,364,102	39,750,540
COPPER-GOLD-SILVER							
1926.....	76	84	27,936,685	3,403	4,546,493	541,914	9,973,049
1927.....	118	125	24,232,169	4,083	5,260,095	596,137	9,822,881
1928.....	164	174	50,004,340	4,777	6,764,309	731,836	15,281,519
1929.....	144	152	52,546,697	5,243	8,498,755	1,035,133	21,859,907
1930.....	61	68	45,844,395	5,694	9,156,759	1,272,262	15,629,564
SILVER-COBALT							
1926.....	33	37	40,504,721	1,779	2,815,930	518,907	5,470,433
1927.....	23	26	30,123,645	1,458	2,178,163	472,548	4,760,546
1928.....	15	19	22,027,683	1,166	1,809,466	430,683	3,938,884
1929.....	27	32	15,820,435	1,149	1,532,333	407,952	3,918,316
1930.....	23	28	12,268,322	1,043	1,488,591	352,844	3,637,181
SILVER-LEAD-ZINC							
1926.....	108	127	22,699,417	2,924	4,431,730	658,679	26,190,034
1927.....	157	173	28,036,330	3,106	4,807,817	588,520	17,520,130
1928.....	132	150	38,894,892	3,680	5,531,634	671,564	17,123,455
1929.....	149	168	50,573,661	4,153	6,482,392	793,139	22,748,089
1930.....	86	93	42,053,674	2,866	4,263,961	654,685	13,000,815
NICKEL-COPPER							
1926.....	2	6	38,593,359	1,437	1,963,617	95,621	4,627,175
1927.....	2	6	39,272,009	1,617	2,486,313	120,686	5,223,668
1928.....	4	8	45,059,704	1,963	3,136,838	121,005	5,831,640
1929.....	2	5	19,448,290	3,219	5,105,875	184,363	7,967,640
1930.....	2	5	26,194,605	3,483	5,388,783	200,151	8,460,556
MISCELLANEOUS							
1926.....	2	2	87,588	25	10,626	3,844	11,072
1927.....	5	5	641,600	65	23,944	460	8,980
1928.....	5	5	627,000	62	61,886	8,880	6,732
1929.....	8	8	6,050	94	42,837	10,217	6,400
1930.....	10	10	427,906	116	110,096	5,100	2,595
NON-FERROUS METAL SMELTING AND REFINING							
1926.....	7	9	81,779,240	6,226	9,584,938	6,076,627	*33,615,909
1927.....	8	10	85,366,662	7,671	12,120,240	6,380,127	*45,479,578
1928.....	8	10	120,035,742	7,526	12,228,738	5,180,770	*61,080,477
1929.....	7	10	146,699,085	8,119	13,772,393	6,208,733	*68,438,022
1930.....	10	13	175,010,686	8,626	13,796,124	6,465,897	*55,635,664

* Value added by smelting.

Table 21.—Principal Statistics of the Mineral Industry in Canada by Industries,
1926-1930—Continued

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
Total Metal Mining Industries							
1926.....	396	1,504	320,248,840	23,742	36,033,798	10,023,885	115,939,119
1927.....	479	517	335,708,206	26,343	46,284,887	10,411,397	121,062,811
1928.....	508	548	435,327,646	28,582	44,687,131	9,756,573	140,770,772
1929.....	485	528	427,498,173	31,125	50,279,511	11,221,987	163,050,366
1930.....	325	352	427,439,265	30,625	48,851,303	11,323,313	136,994,693
Non-Metal Mining Industries including Fuels							
(b) FUELS							
COAL							
1926.....	433	457	148,278,315	28,368	35,841,796	4,631,691	56,494,375
1927.....	385	437	146,392,808	29,772	38,955,967	3,558,926	58,439,742
1928.....	380	427	146,835,825	30,256	43,320,811	3,679,721	60,462,687
1929.....	357	413	141,766,727	29,739	42,376,378	3,657,355	59,584,545
1930.....	390	430	140,316,395	29,172	36,442,361	3,595,416	49,905,327
NATURAL GAS							
1926.....	169	2,255	57,231,261	1,254	1,448,778	40,444	7,350,170
1927.....	172	2,290	56,777,091	1,342	1,535,498	11,181	7,689,916
1928.....	155	2,073	62,073,384	1,660	2,105,648	34,396	7,216,054
1929.....	145	2,298	68,592,709	1,953	2,275,147	41,590	8,555,971
1930.....	124	2,280	70,548,353	1,941	2,349,703	33,811	8,447,385
PETROLEUM							
1926.....	210	2,822	17,639,142	634	788,843	77,902	1,311,665
1927.....	206	2,734	22,773,916	781	1,120,224	112,763	1,516,043
1928.....	190	2,763	31,182,352	1,118	1,916,625	205,183	2,807,528
1929.....	231	2,635	54,526,398	2,221	3,748,689	293,554	4,368,374
1930.....	234	2,324	63,300,244	1,869	3,337,754	363,998	6,481,847
TOTAL FUELS							
1926.....	812	5,534	223,148,718	30,256	38,079,417	4,750,087	65,156,210
1927.....	763	5,461	225,948,815	31,895	41,611,689	3,682,870	67,645,701
1928.....	725	5,263	240,091,561	33,034	47,848,084	3,919,900	70,436,269
1929.....	733	5,346	264,885,834	35,913	48,400,214	3,992,899	72,508,890
1930.....	748	5,034	274,164,992	32,932	42,129,818	3,993,225	64,834,559
OTHER NON-METAL MINING INDUSTRIES							
ABRASIVES—NATURAL							
1926.....	8	8	358,342	102	90,069	9,716	152,433
1927.....	9	9	433,810	132	107,603	10,279	132,552
1928.....	9	9	448,618	163	96,558	12,998	119,715
1929.....	9	9	790,791	154	152,805	18,942	122,684
1930.....	10	10	345,102	45	42,867	4,305	80,108
ASBESTOS							
1926.....	8	16	34,905,096	2,797	3,544,097	1,012,232	10,099,423
1927.....	7	13	35,316,821	2,976	3,761,192	1,046,541	10,621,013
1928.....	7	14	35,705,212	3,170	3,989,644	1,177,715	11,238,360
1929.....	7	8	33,248,957	3,391	4,410,535	1,335,610	13,172,581
1930.....	7	8	35,097,872	2,770	3,474,215	1,133,737	8,390,163

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1926-1930—Continued

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
OTHER NON-METAL MINING INDUSTRIES—Continued							
FELDSPAR							
1926.....	29	30	582,350	410	213,571	14,654	310,238
1927.....	29	29	322,978	234	151,553	10,232	259,151
1928.....	20	21	237,400	223	144,660	12,898	284,942
1929.....	19	20	223,443	209	164,440	14,122	340,471
1930.....	25	26	106,361	251	113,783	8,575	268,469
GRAPHITE							
1926.....	3	3	1,132,273	68	63,064	10,804	194,860
1927.....			Included with	Miscellaneous			
1928.....			"	"			
1929.....			"	"			
1930.....			"	"			
GYPSUM							
1926.....	18	19	6,696,077	1,368	1,255,427	241,414	2,770,813
1927.....	19	23	9,055,624	1,427	1,311,688	198,199	3,251,015
1928.....	16	22	8,035,319	1,159	1,171,814	242,260	3,743,648
1929.....	17	22	7,438,605	987	1,054,213	281,019	3,345,696
1930.....	16	18	8,796,865	822	781,639	201,409	2,818,788
IRON OXIDES (OCHRE)							
1926.....	5	5	178,078	45	38,348	17,576	101,843
1927.....	5	5	153,317	48	38,680	18,222	103,536
1928.....	5	5	154,251	45	38,834	18,666	111,198
1929.....	4	4	159,523	48	47,324	13,564	115,932
1930.....	4	4	150,704	43	41,238	13,929	83,873
MICA							
1926.....	22	22	186,478	208	128,269	5,353	229,204
1927.....	21	21	322,389	168	118,505	4,400	174,377
1928.....	16	16	260,074	94	42,159	1,966	87,168
1929.....	14	14	281,295	83	47,362	355	118,549
1930.....	13	13	441,744	244	63,316	1,102	96,004
QUARTZ							
1926.....	17	18	1,056,705	243	208,839	44,311	553,161
1927.....	19	20	963,216	267	271,555	34,423	496,364
1928.....	17	18	1,159,085	258	222,672	35,948	523,933
1929.....	19	20	1,000,232	279	189,451	27,340	561,527
1930.....	26	26	764,127	178	143,605	27,070	418,127
SALT							
1926.....	11	12	2,782,728	384	482,651	324,612	1,480,149
1927.....	10	11	3,194,802	376	499,967	287,260	1,614,667
1928.....	9	10	4,422,922	455	539,775	252,468	1,495,971
1929.....	8	8	4,576,543	424	516,453	249,664	1,578,086
1930.....	8	8	4,685,549	381	455,539	197,313	1,694,631
TALC AND SOAPSTONE							
1926.....	6	6	681,434	92	74,634	25,023	217,195
1927.....	8	9	715,439	122	87,721	25,169	236,105
1928.....	5	5	732,608	91	85,161	21,850	219,358
1929.....	5	5	654,635	86	74,300	21,395	229,198
1930.....	6	6	614,384	141	79,472	16,369	186,216

Table 21.—Principal Statistics of the Mineral Industry in Canada by Industries, 1926-1930—Continued

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
OTHER NON-METAL MINING INDUSTRIES—Concluded							
MISCELLANEOUS							
1926.....	28	28	2,400,850	193	201,468	79,877	386,892
1927.....	32	32	3,315,380	304	313,338	85,302	670,950
1928.....	33	33	4,478,481	394	414,650	128,029	1,002,399
1929.....	38	38	4,042,638	506	545,216	79,463	1,502,574
1930.....	38	38	3,608,896	498	527,183	188,449	1,192,417
TOTAL OTHER NON-METAL MINING INDUSTRIES							
1926.....	155	167	50,960,411	5,910	6,300,437	1,785,572	16,496,211
1927.....	159	173	53,793,776	6,054	6,661,809	1,780,087	17,559,780
1928.....	187	153	55,633,970	6,052	6,745,927	1,904,798	18,826,692
1929.....	140	148	52,416,662	6,167	7,202,099	2,041,474	21,087,298
1930.....	153	157	54,611,604	5,873	6,722,857	1,792,268	15,228,796
Total Non-Metal Mining Industries Including Fuels							
1926.....	967	5,701	274,109,129	36,166	44,379,854	6,535,609	81,652,421
1927.....	922	5,633	279,737,591	37,949	48,273,491	5,462,897	85,205,431
1928.....	862	5,416	295,725,531	39,086	54,089,011	5,824,098	89,312,961
1929.....	873	5,494	317,302,496	40,080	55,602,313	6,033,773	93,596,188
1930.....	901	5,191	328,776,596	38,355	47,852,675	5,785,483	80,063,355
Clay Products and Other Structural Materials							
CLAY PRODUCTS							
Brick, Tile and Sewer Pipe							
1926.....	188	194	27,842,019	4,239	4,215,035	2,064,516	10,030,745
1927.....	177	186	30,050,885	4,597	4,598,746	2,072,561	10,848,633
1928.....	170	179	32,071,948	5,024	4,999,575	2,278,421	12,013,006
1929.....	181	191	33,493,902	8,366	5,541,452	2,902,869	13,568,646
1930.....	186	198	32,757,926	4,870	4,807,380	1,910,899	10,296,960
STONEWARE AND POTTERY							
1926.....	4	4	310,043	149	130,254	15,538	322,726
1927.....	5	5	359,918	152	50,965	12,956	311,085
1928.....	4	4	401,255	161	175,087	15,929	359,562
1929.....	4	4	696,154	155	177,620	17,515	326,408
1930.....	5	5	672,851	156	153,750	11,707	296,618
TOTAL CLAY PRODUCTS*							
1926.....	194	200	28,152,062	4,385	4,346,687	2,080,054	10,357,323
1927.....	185	194	30,437,607	4,776	4,769,807	2,088,724	11,173,189
1928.....	177	186	32,478,203	5,195	5,181,398	2,294,550	12,381,718
1929.....	186	196	34,190,056	5,530	5,727,014	2,980,884	13,904,643
1930.....	191	203	33,430,777	5,026	4,961,130	1,922,606	10,593,578

*Includes kaolin and other clays.

Table 21.—Principal Statistics of the Mineral Industry in Canada by Industries, 1926-1930—Concluded

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
OTHER STRUCTURAL MATERIALS							
CEMENT							
1926.....	7	12	41,380,000	2,340	3,052,662	3,424,156	13,013,283
1927.....	6	12	40,509,319	2,270	3,143,932	3,546,000	14,391,937
1928.....	5	11	47,678,841	2,407	3,405,385	3,872,108	16,739,163
1929.....	8	11	50,881,818	2,546	3,523,595	4,347,219	19,337,235
1930.....	8	11	59,210,737	2,317	3,172,198	4,120,367	17,713,067
LIME							
1926.....	54	60	5,825,809	1,106	1,082,854	788,990	3,781,484
1927.....	53	60	6,200,481	1,132	1,133,708	826,436	3,923,388
1928.....	46	54	6,952,079	1,218	1,316,115	912,395	4,534,668
1929.....	46	53	7,404,677	1,382	1,393,092	1,183,313	5,908,610
1930.....	44	50	8,816,879	1,086	1,087,778	886,354	4,038,698
SAND AND GRAVEL							
1926.....	580	1,634	6,274,090	5,672	1,557,232	151,236	4,941,434
1927.....	483	2,503	7,668,812	7,133	2,043,962	188,327	6,055,601
1928.....	493	2,553	7,783,135	7,831	2,468,468	193,391	5,809,431
1929.....	541	2,598	9,154,055	8,758	2,505,225	285,491	7,317,814
1930.....	724	2,993	7,550,217	5,601	2,508,037	331,010	8,344,913
STONE							
1926.....	229	234	12,760,078	4,510	3,763,726	514,374	7,865,874
1927.....	222	258	13,810,984	5,071	4,571,605	496,503	9,265,304
1928.....	254	268	16,027,547	5,129	4,806,514	579,086	10,272,301
1929.....	247	268	20,589,758	5,681	5,459,761	759,418	12,066,532
1930.....	285	305	22,196,388	6,192	5,542,211	697,060	13,037,209
TOTAL OTHER STRUCTURAL MATERIALS							
1926.....	870	1,940	66,239,977	13,628	9,456,474	4,878,756	29,602,075
1927.....	764	2,333	68,189,596	15,606	10,893,207	5,067,266	33,636,230
1928.....	798	2,886	78,441,602	16,585	11,996,482	5,556,980	37,355,463
1929.....	842	2,930	88,030,308	18,367	12,881,673	6,575,441	44,630,191
1930.....	1,061	3,359	97,774,221	15,196	12,310,224	6,034,791	43,133,887
Total Clay Products and Other Structural Materials							
1926.....	1,064	2,140	94,392,039	18,023	13,803,161	6,958,810	39,959,398
1927.....	949	3,027	98,627,203	20,382	15,662,514	7,145,990	44,809,419
1928.....	975	3,072	110,914,805	21,780	17,177,880	7,851,330	49,737,181
1929.....	1,028	3,126	122,220,364	23,897	18,608,687	9,495,825	53,534,834
1930.....	1,252	3,562	131,204,998	20,222	17,271,354	7,957,397	53,727,465
GRAND TOTAL OF ALL INDUSTRIES							
1926.....	2,427	9,345	638,750,008	77,931	94,216,813	23,518,304	237,550,938
1927.....	2,350	9,177	714,073,000	84,674	104,220,892	22,960,284	251,077,661
1928.....	2,345	9,436	841,967,982	89,448	115,934,022	23,432,001	279,826,914
1929.....	2,383	9,148	837,021,033	95,102	124,490,511	26,751,585	315,181,388
1930.....	2,478	9,105	887,420,859	89,200	113,975,332	25,066,193	270,785,513

(b) Production of peat for 1926-1930 included in the miscellaneous non-metallics.

Table 22.—Principal Statistics of the Mineral Industry in Canada by Provinces, 1926-1930

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
*NOVA SCOTIA							
1926.....	72	95	60,312,087	13,993	16,109,519	2,941,725	26,702,119
1927.....	78	107	70,934,465	15,663	18,076,122	2,283,744	27,966,861
1928.....	76	104	67,329,525	15,497	21,249,053	2,391,558	28,410,600
1929.....	70	98	67,356,948	14,738	21,035,230	2,436,137	28,529,875
1930.....	74	125	65,363,756	15,484	19,284,197	2,410,115	25,043,071
NEW BRUNSWICK							
1926.....	42	91	3,533,577	1,127	952,696	143,264	1,794,836
1927.....	41	79	3,014,614	1,196	1,092,891	125,847	2,106,635
1928.....	42	97	3,331,338	1,244	1,107,462	147,154	2,153,943
1929.....	36	93	4,945,074	1,361	1,236,726	168,830	2,407,456
1930.....	49	113	5,349,073	1,391	1,132,306	162,591	2,350,372
QUEBEC							
1926.....	331	1,399	112,460,615	15,555	11,912,344	4,662,165	31,629,450
1927.....	381	2,428	110,769,954	18,012	15,104,472	4,988,922	39,617,797
1928.....	402	2,418	133,350,529	17,934	15,921,744	5,953,108	48,631,311
1929.....	412	2,426	146,332,805	19,678	16,886,275	6,703,881	57,313,685
1930.....	387	2,416	140,286,034	15,397	15,190,714	5,885,600	51,673,630
ONTARIO							
1926.....	1,142	5,753	278,657,190	20,060	26,987,635	8,668,666	84,710,014
1927.....	1,014	5,592	282,205,248	21,147	28,753,161	8,642,617	88,824,642
1928.....	1,022	5,390	325,844,956	23,508	31,912,123	8,343,144	99,003,578
1929.....	1,012	5,417	302,937,672	24,924	34,897,624	9,766,197	116,174,844
1930.....	1,123	5,267	326,396,783	24,706	34,433,915	9,022,652	105,434,625
MANITOBA							
1926.....	31	32	10,636,439	780	911,424	442,998	3,069,571
1927.....	32	33	11,780,120	1,007	1,232,805	590,225	2,888,895
1928.....	40	41	15,755,174	1,625	1,926,264	631,430	4,183,342
1929.....	43	51	18,020,285	1,819	2,375,990	992,386	5,423,628
1930.....	50	135	35,812,839	3,021	4,372,044	1,205,288	5,665,008
SASKATCHEWAN							
1926.....	73	74	5,119,845	742	708,612	111,661	1,175,139
1927.....	72	72	5,089,410	1,112	855,704	110,961	1,432,739
1928.....	77	124	5,647,417	1,229	942,150	140,577	1,686,168
1929.....	72	126	6,097,476	1,421	1,139,373	173,677	2,211,708
1930.....	73	144	6,424,080	1,371	1,040,790	229,760	2,333,280
ALBERTA							
1926.....	425	473	102,875,177	10,733	14,499,210	1,380,096	26,351,728
1927.....	376	461	105,203,514	11,205	15,699,304	1,154,548	28,621,537
1928.....	362	490	118,556,978	12,358	18,022,037	1,386,358	31,569,442
1929.....	396	558	142,942,397	13,824	19,915,537	1,476,468	33,883,239
1930.....	418	562	149,974,382	12,675	16,272,916	1,407,136	29,933,896
BRITISH COLUMBIA							
1926.....	226	272	108,594,954	14,566	21,556,415	4,913,255	60,367,481
1927.....	282	329	114,129,277	15,031	22,714,957	4,966,446	58,019,829
1928.....	271	319	159,445,533	15,720	24,064,962	4,312,507	61,847,246
1929.....	321	355	170,575,223	16,882	26,073,143	4,943,945	66,256,597
1930.....	281	319	150,279,895	14,836	21,412,925	4,652,217	45,768,150
YUKON							
1926.....	85	1,156	6,560,124	375	578,958	254,474	1,750,600
1927.....	74	76	10,946,398	301	691,476	96,974	1,598,726
1928.....	53	53	12,706,532	333	808,227	126,165	2,335,316
1929.....	24	24	7,813,153	455	930,613	90,064	2,980,356
1930.....	23	24	7,534,017	319	835,525	90,834	2,583,481
CANADA							
1926.....	2,427	9,345	688,750,008	77,931	94,216,813	23,518,304	237,550,938
1927.....	2,350	9,177	714,073,000	84,674	104,220,892	22,960,284	251,077,661
1928.....	2,345	9,036	841,967,982	89,448	115,954,022	23,432,061	279,820,914
1929.....	2,386	9,148	867,021,033	95,102	124,490,511	26,751,585	315,181,388
1930.....	2,478	9,105	887,420,859	89,200	113,975,332	25,066,193	270,785,513

*Includes a small production from Prince Edward Island.

Table 23.—Principal Statistics of the Mineral Industry in Canada by Main Classes and by Provinces, 1930

(a) Eastern Canada and Total for Canada

Industry	Nova Scotia	New Brunswick	Quebec	Ontario	Total for Eastern Canada	Total for Canada
METAL MINING—						
Number of firms.....	8	2	51	77	138	325
Capital employed..... \$	1,788,677	184,306	59,651,291	219,813,813	281,438,087	427,439,265
Number of salaried employees—						
Male.....	12	4	239	722	977	1,775
Female.....			27	48	75	164
Number of wage-earners.....	199	11	3,323	15,188	18,721	28,684
Total employees.....	211	15	3,589	15,958	19,773	30,623
Salaries..... \$	11,229	3,600	645,261	2,527,226	3,187,316	5,352,312
Wages..... \$	169,446	5,600	4,481,559	23,085,076	27,741,681	43,498,991
Total..... \$	180,675	9,200	5,126,820	25,612,302	30,928,997	48,851,303
Fuel and electricity purchased..... \$	18,120	2,800	1,881,351	5,162,372	7,064,643	11,323,313
Net value of products shipped..... \$	26,000	1,296	24,384,782	75,610,076	100,022,154	136,994,693
NON-METAL MINING INCLUDING FUELS—						
<i>Fuels</i>						
Number of firms.....	15	15		240	270	748
Capital employed..... \$	56,083,335	3,422,626		43,353,975	102,859,936	274,164,992
Number of salaried employees—						
Male.....	470	35		429	934	2,050
Female.....	67	13		104	184	313
Number of wage-earners.....	13,376	639		949	14,964	30,619
Total employees.....	13,913	687		1,482	16,082	32,982
Salaries..... \$	1,005,979	88,263		767,320	1,861,562	4,619,483
Wages..... \$	17,126,422	573,978		882,851	18,583,251	37,510,385
Total..... \$	18,132,401	662,241		1,650,171	20,444,813	42,129,818
Fuel and electricity purchased..... \$	2,180,588	33,522		43,256	2,257,366	3,993,225
Net value of products shipped..... \$	22,552,945	1,174,048		4,926,993	28,653,986	64,834,559
<i>Other Non-Metal Mining—</i>						
Number of firms.....	15	5	63	42	125	153
Capital employed..... \$	5,216,152	952,131	37,876,349	7,951,222	51,995,854	54,611,604
Number of salaried employees—						
Male.....	31	9	226	65	331	381
Female.....	7	2	37	16	62	75
Number of wage-earners.....	508	186	3,134	780	4,608	4,917
Total employees.....	546	197	3,397	861	5,001	5,373
Salaries..... \$	84,024	26,440	538,129	150,477	799,070	905,242
Wages..... \$	409,081	109,396	3,371,136	588,654	4,478,267	4,817,615
Total..... \$	493,105	135,836	3,909,265	739,131	5,277,337	5,722,857
Fuel and electricity purchased..... \$	107,043	34,766	1,206,157	279,957	1,627,923	1,792,258
Net value of products shipped..... \$	1,224,820	551,016	9,322,150	3,084,993	14,182,979	15,228,796
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Number of firms.....	36	27	273	764	1,100	1,252
Capital employed..... \$	2,275,592	790,010	42,758,394	55,277,773	101,101,769	131,204,998
Number of salaried employees—						
Male.....	17	27	280	404	728	936
Female.....	3	3	23	60	89	111
Number of wage-earners.....	794	462	8,108	5,941	15,305	19,175
Total employees.....	814	492	8,411	6,405	16,122	20,222
Salaries..... \$	42,775	59,096	606,161	1,018,549	1,726,581	2,251,024
Wages..... \$	435,241	265,933	5,548,468	5,413,762	11,663,404	15,020,330
Total..... \$	478,016	325,029	6,154,629	6,432,311	13,389,985	17,271,354
Cost of fuel and electricity..... \$	104,364	91,503	2,798,092	3,537,067	6,531,026	7,957,397
Net value of products shipped..... \$	1,239,306	624,012	17,966,698	21,812,563	41,642,579	53,727,465
ALL INDUSTRIES						
Number of firms.....	74	49	387	1,123	1,633	2,478
Capital employed..... \$	65,363,756	5,349,073	140,286,034	326,396,783	537,395,616	887,420,859
Number of salaried employees—						
Male.....	530	75	745	1,620	2,970	5,142
Female.....	77	18	87	228	410	663
Number of wage earners.....	14,877	1,298	14,565	22,858	53,598	83,395
Total employees.....	15,484	1,391	15,397	24,706	56,978	89,200
Salaries..... \$	1,144,007	177,399	1,789,551	4,463,572	7,574,529	13,128,061
Wages..... \$	18,140,190	954,907	13,401,163	29,970,343	62,466,603	100,847,271
Total..... \$	19,284,197	1,132,306	15,190,714	34,433,915	70,041,132	113,975,332
Cost of fuel and electricity..... \$	2,410,115	162,591	5,885,600	9,022,552	17,480,958	25,066,193
Net value of products shipped..... \$	25,043,071	2,350,372	51,673,630	105,434,625	184,501,698	270,785,513

Table 24.—Principal Statistics of the Mineral Industry in Canada by Main Classes and by Provinces, 1930

(b) Western Canada

Industry	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Total for Western Canada
METAL MINING—						
Number of firms.....	5			160	22	187
Capital employed..... \$	24,123,945			114,546,216	7,331,017	146,001,178
Number of salaried employees—						
Male.....	31			751	16	798
Female.....	1			87	1	89
Number of wage-earners.....	1,750			7,914	299	9,963
Total employees.....	1,752			8,752	316	10,850
Salaries..... \$	130,001			1,971,848	63,147	2,164,996
Wages..... \$	3,124,352			11,862,801	770,157	15,757,310
Total..... \$	3,254,353			13,834,649	833,304	17,922,306
Cost of fuel and electricity..... \$	519,017			3,649,109	90,544	4,258,670
Net value of products shipped..... \$	1,082,254			33,309,764	2,580,521	36,972,539
NON-METAL MINING INCLUDING FUELS—						
<i>Fuels</i>						
Number of firms.....	8	56	390	23	1	478
Capital employed..... \$	49,245	4,507,203	142,482,983	24,062,625	203,000	171,305,056
Number of salaried employees—						
Male.....	1	45	832	238		1,116
Female.....		5	104	20		129
Number of wage-earners.....	10	541	10,738	4,363	3	15,655
Total employees.....	11	591	11,674	4,621	3	16,900
Salaries..... \$	900	96,360	2,042,964	617,697		2,757,921
Wages..... \$	8,823	461,724	13,356,684	5,097,632	2,221	18,927,084
Total..... \$	9,723	558,084	15,399,648	5,715,329	2,221	21,685,005
Cost of fuel and electricity..... \$	822	52,454	1,082,195	600,098	290	1,735,859
Net value of products shipped..... \$		933,531	27,279,301	7,964,781	2,960	36,180,573
<i>Other Non-Metal Mining—</i>						
Number of firms.....	3	6	3	16		28
Capital employed..... \$	1,160,697	697,826	98,746	658,481		2,615,750
Number of salaried employees—						
Male.....	17	18	2	13		50
Female.....	4	5	1	3		13
Number of wage-earners.....	95	89	17	108		309
Total employees.....	116	112	20	124		372
Salaries..... \$	48,060	30,648	2,840	24,624		106,172
Wages..... \$	96,077	79,723	7,105	156,443		339,348
Total..... \$	144,137	110,371	9,945	181,067		445,520
Cost of fuel and electricity..... \$	31,190	112,603	875	19,667		164,335
Net value of products shipped..... \$	298,297	298,687	8,268	440,565		1,045,817
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Number of firms.....	34	11	25	82		152
Capital employed..... \$	10,478,952	1,219,051	7,392,653	11,012,573		30,103,229
Number of salaried employees—						
Male.....	57	24	45	82		208
Female.....	5	1	3	13		22
Number of wage-earners.....	1,050	643	933	1,244		3,870
Total employees.....	1,112	668	981	1,339		4,100
Salaries..... \$	138,541	49,353	115,767	220,782		524,443
Wages..... \$	825,290	322,982	747,556	1,461,098		3,356,926
Total..... \$	963,831	372,335	863,323	1,681,880		3,881,369
Cost of fuel and electricity..... \$	654,259	64,703	324,066	383,343		1,426,371
Net value of products shipped..... \$	4,284,457	1,101,062	2,646,327	4,053,040		12,084,886
ALL INDUSTRIES						
Number of firms.....	50	73	418	281	23	845
Capital employed..... \$	35,812,839	6,424,080	149,974,382	150,279,895	7,534,017	350,025,213
Number of salaried employees—						
Male.....	106	87	879	1,084	16	2,172
Female.....	10	11	168	123	1	253
Number of wage-earners.....	2,905	1,273	11,688	13,629	392	29,797
Total employees.....	3,021	1,371	12,675	14,836	319	32,222
Salaries..... \$	317,502	176,361	2,161,571	2,834,951	63,147	5,553,532
Wages..... \$	4,054,542	864,429	14,111,345	18,577,974	772,378	38,380,608
Total..... \$	4,372,044	1,040,790	16,272,916	21,412,925	835,525	43,934,200
Cost of fuel and electricity..... \$	1,265,288	229,760	1,407,136	4,652,217	90,834	7,555,235
Net value of products shipped..... \$	5,665,008	2,333,280	29,933,896	45,768,150	2,583,481	86,283,815

Table 25.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1929					\$	\$	\$
Nova Scotia.....	581	61	14,096	14,738	1,210,079	19,825,151	21,035,230
New Brunswick.....	74	14	1,273	1,361	191,294	1,045,432	1,236,726
Quebec.....	851	78	18,749	19,678	1,770,245	15,116,030	16,886,275
Ontario.....	1,604	247	23,073	24,924	4,178,968	30,718,656	34,897,624
Manitoba.....	117	7	1,695	1,819	312,378	2,063,612	2,375,990
Saskatchewan.....	65	4	1,352	1,421	143,692	995,681	1,139,373
Alberta.....	872	122	12,830	13,824	2,175,625	17,739,912	19,915,537
British Columbia.....	1,209	115	15,558	16,882	2,961,000	23,112,143	26,073,143
Yukon.....	19	2	434	455	74,408	856,205	930,613
Canada.....	5,392	650	89,060	95,102	13,017,639	111,472,822	124,490,511
1930							
Nova Scotia.....	530	77	14,877	15,484	1,144,007	18,140,190	19,284,197
New Brunswick.....	75	18	1,298	1,391	177,399	954,907	1,132,306
Quebec.....	745	87	14,565	15,397	1,789,551	13,401,163	15,190,714
Ontario.....	1,620	228	22,858	24,706	4,463,572	29,970,343	34,433,915
Manitoba.....	106	10	2,905	3,021	317,502	4,054,542	4,372,044
Saskatchewan.....	87	11	1,273	1,371	176,361	864,429	1,040,790
Alberta.....	879	108	11,688	12,675	2,161,571	14,111,345	16,272,916
British Columbia.....	1,084	123	13,629	14,836	2,834,951	18,577,974	21,412,925
Yukon.....	16	1	302	319	63,147	772,378	835,525
Canada.....	5,142	663	83,395	89,200	13,128,061	100,847,271	113,975,332

*Note on the Method of Computing the Average Number of Wage-earners for Each Industry.—If a company works only 3 months in the year, the average number of wage-earners for this company is obtained by adding the monthly figures and dividing by 3. If a second company operates every month in the year, the average number of wage-earners for this company is obtained by adding the monthly figures and dividing by 12. The average number of wage-earners for each other company in the industry is computed in the same way. The average number of wage-earners in the industry during the year is the sum of these individual averages.

Table 26.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1929 and 1930

Industry and Year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1929					\$	\$	\$
METAL MINING							
Alluvial Gold.....	22	7	459	488	66,881	519,312	586,193
Auriferous Quartz.....	491	33	8,136	8,660	1,543,625	12,715,108	14,258,733
Copper-Gold-Silver.....	401	29	4,813	5,243	900,605	7,598,150	8,498,755
Silver-Cobalt.....	90	6	1,053	1,149	235,450	1,296,883	1,532,333
Silver-Lead-Zinc.....	342	29	3,782	4,153	770,457	5,711,935	6,482,392
Nickel-Copper.....	46	1	3,172	3,219	151,655	4,954,220	5,105,875
Miscellaneous.....	5	.....	89	94	11,090	31,747	42,837
Non-Ferrous Smelting and Refining.....	621	63	7,435	8,119	1,753,840	12,018,553	13,772,393
NON-METAL MINING INCLUDING FUELS							
Fuels							
Coal.....	1,402	110	28,227	29,739	3,293,949	39,082,429	42,376,378
Natural Gas.....	475	137	1,341	1,953	881,525	1,393,622	2,275,147
Petroleum.....	178	55	1,988	2,321	383,490	3,365,199	3,748,689

Table 26.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1929 and 1930—Concluded

Industry and Year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1929					\$	\$	\$
<i>Other Non-Metal Mining</i>							
Abrasives—natural.....	16	2	136	154	38,648	114,157	152,805
Asbestos.....	172	25	3,194	3,391	419,799	3,990,736	4,410,535
Feldspar.....	5	4	200	209	19,936	144,504	164,440
Gypsum.....	58	13	916	987	175,256	878,957	1,054,213
Iron Oxides.....	2	.....	46	48	3,560	43,764	47,324
Mica.....	5	.....	78	83	11,116	36,246	47,362
Quartz.....	17	1	261	279	22,311	167,140	189,451
Salt.....	41	12	371	424	102,502	413,951	516,453
Talc and Soapstone.....	7	2	77	86	13,705	60,595	74,300
Miscellaneous.....	46	4	456	506	80,716	464,500	545,216
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	114	10	2,422	2,546	260,579	3,263,016	3,523,595
Clay Products.....	365	50	5,115	5,530	941,445	4,785,569	5,727,014
Lime.....	91	18	1,273	1,382	158,604	1,234,488	1,393,092
Sand and Gravel.....	89	14	8,655	8,758	189,834	2,315,391	2,505,225
Stone.....	291	25	5,365	5,681	587,111	4,872,650	5,459,761
Total.....	5,392	650	89,060	95,102	13,017,689	111,472,822	124,490,511
1930							
<i>METAL MINING</i>							
Alluvial Gold.....	25	5	364	394	76,260	536,109	612,369
Auriferous Quartz.....	443	23	7,935	8,401	1,544,258	12,490,362	14,034,620
Copper-gold-silver.....	269	16	5,409	5,694	724,275	8,432,484	9,156,759
Silver-Cobalt.....	74	3	966	1,043	218,553	1,270,038	1,488,591
Silver-Lead-Zinc.....	220	18	2,628	2,866	579,089	3,684,872	4,263,961
Nickel copper.....	42	1	3,440	3,483	178,211	5,210,572	5,388,783
Miscellaneous.....	12	.....	104	116	21,771	88,325	110,096
Non-Ferrous Smelting and Refining.....	690	98	7,838	8,626	2,009,895	11,786,229	13,796,124
NON-METAL MINING INCLUDING FUELS							
<i>Fuels</i>							
Coal.....	1,335	133	27,704	29,172	3,185,183	33,257,178	36,442,361
Natural Gas.....	513	137	1,291	1,941	974,888	1,374,815	2,349,703
Petroleum.....	202	43	1,624	1,869	459,412	2,878,342	3,337,754
<i>Other Non-Metal Mining</i>							
Abrasives—natural.....	8	3	34	45	18,090	24,777	42,867
Asbestos.....	195	35	2,540	2,770	475,167	2,999,048	3,474,215
Feldspar.....	12	2	237	251	23,550	90,233	113,783
Gypsum.....	56	13	753	822	152,158	629,481	781,639
Iron oxides.....	2	.....	41	43	4,543	36,695	41,238
Mica.....	3	1	240	244	6,938	56,378	63,316
Quartz.....	12	.....	166	178	21,951	121,654	143,605
Salt.....	42	10	329	381	107,637	347,902	455,539
Talc and Soapstone.....	3	2	136	141	10,610	68,862	79,472
Miscellaneous.....	48	9	441	498	84,598	442,585	527,183
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	116	10	2,191	2,317	267,003	2,905,195	3,172,198
Clay products.....	345	54	4,627	5,026	922,499	4,038,631	4,961,130
Lime.....	80	11	995	1,086	148,525	939,253	1,087,778
Sand and Gravel.....	91	9	5,501	5,601	195,634	2,312,403	2,508,037
Stone.....	304	27	5,861	6,192	717,363	4,824,848	5,542,211
Total.....	5,142	663	83,395	89,200	13,128,061	100,847,271	113,975,332

* See note page 37.

Table 27.—Wage-Earners in the Mineral Industry in Canada, by Months and by Classes, 1929 and 1930

Month	Metal Mining	Non-Metal Mining including Fuels			Clay Products and other Structural Materials			Total
		Fuels	Other Non-Metal-lics	Total	Clay Products	Other structural materials	Total	
1929								
January.....	25,052	31,961	4,155	36,116	2,838	6,081	8,919	70,087
February.....	25,330	31,564	4,423	35,987	2,445	5,998	8,443	69,760
March.....	25,377	29,531	4,687	34,218	2,950	6,799	9,749	69,344
April.....	25,917	28,300	4,952	33,252	4,043	8,630	12,673	71,842
May.....	27,262	27,992	5,803	33,795	5,123	10,979	16,102	77,159
June.....	28,096	29,011	5,898	34,909	5,586	17,002	22,588	85,593
July.....	28,755	29,440	6,085	35,525	5,675	17,384	23,059	87,339
August.....	28,989	30,424	6,090	36,514	5,654	12,111	17,765	83,268
September.....	28,921	32,416	6,137	38,553	5,210	11,195	16,405	83,879
October.....	29,417	33,799	5,968	39,767	4,707	10,521	15,228	84,412
November.....	28,993	33,894	5,527	39,421	4,307	9,066	13,373	81,787
December.....	27,268	33,727	5,037	38,764	3,598	6,853	10,451	76,483
*Average.....	28,939	31,556	5,735	37,291	5,115	17,715	22,830	89,060
1930								
January.....	28,118	33,074	4,308	37,382	2,602	5,608	8,210	73,710
February.....	28,179	31,368	4,241	35,609	2,411	5,717	8,128	71,916
March.....	27,739	29,353	4,553	33,906	2,751	6,508	9,259	70,904
April.....	27,750	27,697	4,404	32,101	3,670	8,358	12,028	71,879
May.....	28,292	27,637	4,712	32,349	4,630	13,241	17,871	78,512
June.....	28,372	28,036	4,677	32,713	5,099	13,810	18,909	79,994
July.....	28,448	28,183	4,881	33,064	5,166	13,981	19,147	80,659
August.....	27,839	29,024	4,858	33,882	4,795	13,708	18,503	80,224
September.....	27,663	30,554	4,589	35,143	4,349	12,818	17,167	79,973
October.....	26,918	32,599	4,401	37,000	3,651	11,719	15,370	79,288
November.....	24,473	33,154	4,305	37,459	3,165	10,081	13,196	75,128
December.....	23,572	33,005	3,594	36,599	2,640	6,316	8,956	69,127
*Average.....	28,684	30,619	4,917	35,536	4,627	14,548	19,175	82,395

* See note page 37.

Table 28.—Wage-Earners in the Mineral Industry in Canada, by Months and by Provinces, 1929 and 1930

Month	Nova Scotia	New Brunswick	Quebec	Ontario	Mani-toba	Sas-katche-wan	Alberta	British Colum-bia	Yukon	Canada
1929										
January.....	13,572	1,032	9,468	18,074	828	784	12,648	13,426	255	70,087
February.....	13,392	1,080	9,410	18,158	834	748	12,556	13,319	263	69,760
March.....	13,047	1,075	9,700	18,932	958	723	10,747	13,890	272	69,344
April.....	13,557	1,084	10,526	20,628	1,206	760	9,624	14,159	298	71,842
May.....	13,981	1,231	12,504	22,420	1,492	895	9,922	14,298	416	77,159
June.....	14,213	1,303	18,230	23,084	1,897	937	10,821	14,655	443	85,593
July.....	14,080	1,347	18,626	23,683	1,951	809	11,248	15,054	460	87,339
August.....	13,973	1,340	13,669	23,820	2,028	827	12,093	15,053	465	83,268
September.....	14,285	1,292	13,357	23,199	1,802	1,030	13,074	15,374	466	83,879
October.....	14,261	1,245	13,118	23,010	1,575	1,033	14,094	15,655	421	84,412
November.....	14,076	1,175	12,541	22,034	1,382	957	14,078	15,207	337	81,787
December.....	13,869	1,015	11,133	20,326	1,062	856	13,946	14,003	273	76,483
*Average.....	14,096	1,273	18,749	23,073	1,695	1,352	12,830	15,558	434	89,060
1930										
January.....	13,981	915	9,413	19,180	2,040	777	13,209	13,938	257	73,710
February.....	13,767	910	9,405	19,200	2,044	730	11,838	13,761	261	71,916
March.....	13,717	944	9,916	19,982	2,117	649	10,816	12,526	237	70,904
April.....	14,314	1,033	10,302	21,020	2,400	678	9,164	12,594	374	71,879
May.....	14,764	1,199	13,947	22,551	2,880	841	9,059	12,917	354	78,512
June.....	14,896	1,260	14,275	22,644	3,218	805	9,303	13,234	359	79,994
July.....	14,829	1,286	14,363	22,978	3,415	852	9,461	13,141	334	80,659
August.....	14,721	1,267	14,185	22,792	2,990	871	10,115	12,946	337	80,224
September.....	14,692	1,213	13,474	22,233	2,773	891	11,570	12,785	342	79,973
October.....	14,668	1,222	12,604	21,131	2,365	1,149	13,056	12,808	285	79,288
November.....	14,377	1,051	12,128	18,989	2,038	955	13,315	12,047	228	75,128
December.....	14,339	1,016	8,575	17,973	1,916	852	12,992	11,292	172	69,127
*Average.....	14,877	1,298	14,565	22,858	2,905	1,273	11,688	13,629	302	83,395

* See note page 37.

Table 29.—Wage-Earners Working in Month of Greatest Employment Classified According to the Number of Hours Worked per Day for the Mineral Industry in Canada, by Provinces and by Industries, 1929 and 1930

Province and Industry	Number of wage-earners working			
	8 hours or less per day	9 hours	10 hours	Over 10 hours
1929				
By Provinces—				
Nova Scotia.....	15,707	852	774	20
New Brunswick.....	3,297	909	220	22
Quebec.....	3,271	2,824	8,907	869
Ontario.....	14,009	6,314	4,983	895
Manitoba.....	342	295	1,127	289
Saskatchewan.....	74	95	858	62
Alberta.....	14,686	823	618	123
British Columbia.....	17,934	157	90	25
Yukon.....	504	1	2	.....
Canada.....	66,824	12,270	17,579	2,305
By Industries—				
METAL MINING—				
Alluvial Gold.....	415	74	74	10
Auriferous Quartz.....	7,335	1,448	138	70
Copper-Gold-Silver.....	4,463	1,067	150	81
Silver-Cobalt.....	837	242	4	9
Silver-Lead-Zinc.....	4,166	142	262	34
Nickel-Copper.....	3,219	685	260	2
Miscellaneous.....	47	26	23	.....
Non-Ferrous Smelting and Refining.....	6,514	1,071	807	44
Non-METAL MINING INCLUDING FUELS—				
Fuels—				
Coal.....	33,860	930	852	20
Natural Gas.....	468	879	37	6
Petroleum.....	1,963	172	97	71
Other Non-Metal Mining—				
Abrasives.....	22	30	175	2
Asbestos.....	.....	55	3,238	68
Feldspar.....	.....	146	132	.....
Gypsum.....	91	536	478	130
Iron Oxides.....	.....	.....	39	16
Mica.....	.....	35	63	.....
Quartz.....	58	36	240	6
Salt.....	43	179	158	20
Talc and Soapstone.....	.....	6	72	.....
Miscellaneous.....	160	46	304	39
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—				
Cement.....	943	551	845	482
Clay Products.....	829	1,986	3,010	435
Lime.....	310	295	780	226
Sand and Gravel.....	256	266	796	99
Stone.....	816	1,367	4,545	435
Total.....	66,824	12,270	17,579	2,305
1930				
By Provinces—				
Nova Scotia.....	15,556	876	980	52
New Brunswick.....	329	677	425	29
Quebec.....	3,996	2,657	9,574	1,123
Ontario.....	15,264	4,899	4,682	668
Manitoba.....	2,151	198	970	263
Saskatchewan.....	172	103	896	68
Alberta.....	13,443	522	540	109
British Columbia.....	15,588	101	48	17
Yukon.....	241	.....	210	.....
Canada.....	66,740	10,033	18,325	2,329
By Industries—				
METAL MINING—				
Alluvial Gold.....	142	46	306	4
Auriferous Quartz.....	7,324	75	168	36
Copper-Gold-Silver.....	5,705	736	65	79
Silver-Cobalt.....	646	279	10	9
Silver-Lead-Zinc.....	3,010	215	98	7
Nickel-Copper.....	3,609	645	36	7
Miscellaneous.....	76	48	.....	.....
Non-Ferrous Smelting and Refining.....	6,627	1,416	447	79

Table 29.—Wage-Earners Working in Month of Greatest Employment Classified According to the Number of Hours Worked per Day for the Mineral Industry in Canada, by Provinces and by Industries, 1929 and 1930—Concluded

Province and Industry	Number of wage-earners working			
	8 hours or less per day	9 hours	10 hours	Over 10 10 hours
NON-METAL MINING INCLUDING FUELS—				
<i>Fuels—</i>				
Coal.....	31,933	896	931	29
Natural Gas.....	700	799	25	16
Petroleum.....	1,732	15	85	8
<i>Other Non-Metal Mining—</i>				
Abrasives.....	8		49	
Asbestos.....	765	52	2,654	405
Feldspar.....	3	149	110	
Gypsum.....	75	270	674	52
Iron Oxides.....			49	14
Mica.....	194	83	48	
Quartz.....		58	123	8
Salt.....	66	134	107	72
Talc and Soapstone.....		12	123	
Miscellaneous.....	90	32	261	191
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—				
Cement.....	1,276	246	563	457
Clay Products.....	1,171	1,384	2,605	413
Lime.....	297	252	446	232
Sand and Gravel.....	263	138	3,247	48
Stone.....	1,028	1,153	5,095	163
Total.....	66,740	10,033	18,325	2,329

Table 30.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
METAL MINING						
Alluvial Gold.....Quantity	1		4			
\$	5		80			
Auriferous Quartz.....Quantity	591	23,603	1,451			195
\$	7,718	240,803	8,408			3,456
Copper-Gold-Silver.....Quantity	4,088	1,297		3	2	44
\$	45,050	10,927		121	26	854
Silver-Cobalt.....Quantity		6,424	783			
\$		72,857	12,308			
Silver-Lead-Zinc.....Quantity	40,204	2,815	19	157	111	220
\$	198,195	25,047	554	1,338	1,177	2,193
Nickel-Copper.....Quantity		6,614	64			72
\$		41,414	1,085			636
Miscellaneous.....Quantity		2				
\$		12				
Non-Ferrous Smelting and Refining.....Quantity	81,613	165,069				*14,014
\$	616,384	1,016,939				146,330
Total.....Quantity	126,497	205,824	2,321	160	113	14,545
\$	867,352	1,407,999	22,435	1,459	1,203	153,469
NON-METAL MINING, INCLUDING FUELS						
<i>Fuels</i>						
Coal.....Quantity	828,352			152,248		
\$	2,932,230			142,141		
Natural Gas.....Quantity	1,783					2
\$	8,545					28
Petroleum.....Quantity	5,163			2,757		
\$	38,691			19,071		
Total.....Quantity	835,298			155,005		2
\$	2,979,466			161,212		28
<i>Other Non-Metal Mining</i>						
Asbestos.....Quantity	39,590	16,427	16,371			1,682
\$	284,225	126,149	107,320			21,016
Feldspar.....Quantity		799			1	
\$		6,524			16	
Gypsum.....Quantity	11,646	8,132				1,298
\$	68,375	61,434				12,965
Iron Oxides.....Quantity	1,034		22			
\$	8,916		330			
Mica.....Quantity		40				
\$		280				
Quartz.....Quantity	45	3,176				
\$	382	18,010				
Salt.....Quantity	2,095	49,713				
\$	9,641	216,911				
Talc.....Quantity		370				
\$		2,456				
Miscellaneous.....Quantity	2,431	2,188	2			
\$	13,715	9,402	31			
Natural Abrasives.....Quantity	1,753			190		26
\$	13,996			847		312
Total.....Quantity	58,594	80,845	16,395	190	1	3,006
\$	399,250	441,166	107,681	847	16	34,293

* Coke used for fuel only. Coke used in smelting amounted to 368,322 tons, valued at \$3,280,757.

Industry in Canada, by Kinds and by Industries, 1929

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
1,589 969	239 127	237 858	180 930						9,040,492	2,365,008 23,650
82,754 31,782	9,868 2,973	1,616,247 136,786	30,784 162,973				233,219,275 1,983,959	2,969 2,579,481	12,826,279	2,805,900 28,059
79,702 40,348	7,856 2,530	829,518 101,147	20,246 94,712				96,457,100 739,141		25,983,571	
3,398 1,056	75 18	86,810 11,649	3,079 14,602				15,576,292 275,789	407,952		
81,785 36,183	1,534 543	624,389 119,378	9,778 53,557				53,499,043 354,932	793,139	14,610,124	3,859,990 25,790
8,147 1,957	2,254 557	87,168 9,199	42 305				62,833,171 129,210	184,363		
300 80		12,000 3,000	1,500 7,125					10,217		
85,155 23,957		12,520,517 913,578	612 4,411	282,531 34,751			1,200,557,202 3,451,255	6,208,733	161,547,487	26,539,711 190,959
342,830 136,332	21,826 6,748	15,776,886 1,295,595	66,221 338,615	282,531 34,751		21,743	1,662,142,083 6,934,286	11,221,987	224,007,953	35,570,609 268,458
10,283 3,072	1,232 367		2,008 9,295				40,326,458 570,250	3,657,355	108,949,704	6,554,222 100,321
			18 158		83,002 32,779		3,055 80	41,590		
44,640 13,417	371 89	342,320 26,027	624 3,148		5,489,032 169,868		2,207,179 23,043	293,354		
54,923 16,489	1,603 456	842,320 26,027	2,660 12,601		5,672,034 202,647		42,536,692 593,373	3,992,299	108,949,704	6,554,222 100,321
32,740 6,875	5,776 1,142	3,250 293					71,387,897 788,590	1,335,610		
21,209 5,105	948 209		602 2,268					14,122		
143,991 36,664	1,314 329	219,559 15,836	1,802 3,754		3,335 1,395		5,758,484 80,267	281,019		
		145 18	227 1,313				149,328 2,987	13,564		
117 42			5 33					355	45	
2,911 691	747 156	12,861 824					478,881 7,277	27,340		
		98,427 4,678					1,323,087 12,536	249,664		
601 159							1,011,292 18,780	21,395		
8,541 2,563	125 36	346,965 29,768	646 1,636	127,171 10,174			891,300 12,138	79,463		
5,459 1,286	666 200		385 1,990				10,096 311	18,942		
215,569 63,386	9,576 2,072	681,407 51,417	3,667 10,994	127,171 10,174	3,335 1,395	5,898	81,010,365 922,886	2,041,474	45	

Table 30.—Fuel and Electricity Used in the Mineral Industry

Industry	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement.....Quantity	308,090	298,969	.....	11,826	.....	130
\$	1,597,808	1,750,170	.....	43,726	.....	1,362
Clay Products.....Quantity	30,425	266,046	3,550	28,309	.....	4,279
\$	210,132	1,725,021	28,074	61,970	.....	31,193
Lime.....Quantity	39,948	90,014	1,225	.....	.....	11,760
\$	254,344	421,968	5,156	.....	.....	79,607
Sand and Gravel.....Quantity	3,552	33,636	16	1,097	.....	.....
\$	27,646	188,389	248	3,403	.....	.....
Stone.....Quantity	12,131	27,617	677	.....	.....	4
\$	81,422	189,384	4,853	.....	.....	40
Total.....Quantity	394,146	716,282	5,468	41,232	.....	16,173
\$	2,171,352	4,274,932	38,331	109,099	.....	112,202
Canada.....Quantity	1,414,535	1,002,951	24,184	196,587	114	33,726
\$	6,417,420	6,124,097	168,447	272,617	1,219	299,992

in Canada, by Kinds and by Industries, 1929—Concluded

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
18,689 4,501	2,798 612	27,471 3,571					200,133,083 945,469		16,386,100	
							4,347,219			
57,352 13,360	2,109 639	222,950 24,793	65,711 339,282		915,979 36,853		30,018,402 449,067			
							2,920,384			
3,706 967	310 76	343,245 11,330	73,104 310,792	268,588 21,487	17,549 8,537		9,443,592 69,049		387,286	
							1,183,313			
80,030 19,638	594 135	2,792 1,023					3,722,349 45,009			
							285,491			
171,074 43,145	61,517 9,866	186,489 18,231	3,841 18,582				25,405,092 393,895		1,313,359	
							759,418			
330,851 81,611	67,328 11,328	782,947 58,948	142,656 668,656	268,588 21,487	933,528 45,390		268,722,518 1,902,489		18,086,745	
							9,495,825			
944,173 287,817	100,333 20,604	17,583,360 1,431,987	215,194 1,030,866	678,290 66,412	6,508,897 249,432	27,641	2,054,411,658 10,353,034		351,044,447	42,124,831 368,779
							26,751,585			

Table 31.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthracite coal	Lignite coal		Coke
	Canadian	Imported		Canadian	Imported	
	Tons	Tons	Tons	Tons	Tons	Tons
METAL MINING						
Alluvial Gold.....Quantity	80	41	.....	169	.....	.....
.....\$	670	410	.....	723	.....	.....
Auriferous Quartz.....Quantity	431	17,876	470	.....	.....	142
.....\$	5,569	172,189	7,819	.....	.....	2,512
Copper-Gold-Silver.....Quantity	7,975	2,793	42	131	.....	211
.....\$	70,552	24,601	685	1,183	.....	3,188
Silver-Cobalt.....Quantity	.....	5,184	842	.....	.....	.....
.....\$	.....	58,574	12,823	.....	.....	.....
Silver-Lead-Zinc.....Quantity	31,484	1,170	.....	80	.....	171
.....\$	156,428	9,335	.....	720	.....	1,286
Nickel-Copper.....Quantity	.....	6,935	38	.....	.....	270
.....\$	.....	40,160	653	.....	.....	2,526
Miscellaneous.....Quantity	400	.....	.....	.....	.....	.....
.....\$	2,800	.....	.....	.....	.....	.....
Non-Ferrous Smelting and Refining.....Quantity	71,165	194,039	2,913	.....	.....	*11,476
.....\$	419,719	1,009,947	30,721	.....	.....	117,449
Total.....Quantity	111,535	227,978	4,305	380	.....	12,270
.....\$	655,738	1,315,216	52,701	2,626	.....	126,961
NON-METAL MINING, INCLUDING FUELS						
<i>Fuels</i>						
Coal.....Quantity	745,554	.....	.....	134,959	.....	.....
.....\$	2,546,797	.....	.....	122,485	.....	.....
Natural Gas.....Quantity	.....	.....	.....	.....	.....	.....
.....\$
Petroleum.....Quantity	11,968	.....	.....	666	.....	2
.....\$	75,149	.....	.....	4,210	.....	26
Total.....Quantity	757,522	.....	.....	135,625	.....	2
.....\$	2,621,946	.....	.....	126,695	.....	26
<i>Other Non-Metal Mining</i>						
Asbestos.....Quantity	34,084	6,665	14,195	.....	.....	1,080
.....\$	229,607	51,478	95,666	.....	.....	12,632
Feldspar.....Quantity	101	475	.....	.....	.....	1
.....\$	736	3,875	.....	.....	.....	17
Gypsum.....Quantity	6,717	3,976	.....	.....	.....	1,177
.....\$	48,007	26,326	.....	.....	.....	10,812
Iron Oxides.....Quantity	149	52	16	.....	.....	.....
.....\$	1,084	406	240	.....	.....	.....
Mica.....Quantity	.....	125	5	.....	.....	.....
.....\$	.....	913	71	.....	.....	.....
Quartz.....Quantity	63	2,185	.....	459	.....	.....
.....\$	411	12,019	.....	2,983	.....	.....
Salt.....Quantity	2,500	42,426	.....	.....	.....	.....
.....\$	11,320	171,926	.....	.....	.....	.....
Talc and Soapstone.....Quantity	.....	230	46	.....	.....	.....
.....\$	.....	1,470	600	.....	.....	.....
Miscellaneous.....Quantity	8,406	606	21	10,139	.....	.....
.....\$	44,442	2,828	325	33,663	.....	.....
Natural Abrasives.....Quantity	499	.....	.....	62	.....	.....
.....\$	3,183	.....	.....	310	.....	.....
Total.....Quantity	52,519	56,740	14,283	10,680	.....	2,258
.....\$	338,790	271,241	96,902	36,956	.....	23,461
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement.....Quantity	309,262	299,459	889	.....	.....	94
.....\$	1,608,969	1,694,382	3,245	.....	.....	879
Clay Products.....Quantity	39,454	171,455	3,722	9,666	874	3,228
.....\$	227,383	1,039,101	26,248	23,681	5,303	26,548
Lime.....Quantity	32,263	58,524	5,120	.....	.....	10,920
.....\$	204,296	273,273	24,428	.....	.....	72,694
Sand and Gravel.....Quantity	1,323	28,204	7,763	.....	.....	4
.....\$	10,863	169,654	53,040	.....	.....	45
Stone.....Quantity	7,180	22,870	1,086	355	.....	90
.....\$	48,061	151,626	6,148	2,639	.....	925
Total.....Quantity	389,482	580,512	18,580	10,021	874	14,336
.....\$	2,099,572	3,328,036	113,199	26,320	5,303	101,091
Canada.....Quantity	1,311,058	865,230	37,168	156,686	874	28,866
.....\$	5,716,046	4,914,493	262,712	192,597	5,303	251,539

*Coke used for fuel only. Coke used in smelting amounted to 371,093 tons valued at \$3,262,541.

Industry in Canada, by Kinds and by Industries, 1930

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
10,025	1,449		450						11,696,500	2,834,200
3,345	544		2,580					8,272		28,342
30,708	4,016	1,700,621	11,640	13			213,116,298		8,493,201	61,648
11,304	1,162	170,614	64,518	278		869	1,927,268	2,364,102		1,233
182,335	9,334	977,664	4,269	17			125,127,010		35,166,627	
50,939	2,580	78,283	18,540	54		21,896	998,761	1,272,262		
2,149	500	78,074	1,143				17,487,933			
670	125	10,338	7,080			38,181	225,053	352,844		
65,220	886	829,154	2,199				49,482,317		22,915,897	
26,703	234	144,202	19,795				255,982	654,685		
1,416	1,808	91,931					60,523,328			
368	423	9,651					146,370	200,151		
1,364			400							
300			2,000					5,100		
66,129	5,722	11,375,423	13,261	219,231	324		1,286,754,023		230,985,901	24,740,300
16,069	1,329	809,721	90,675	21,923	254	6,200	3,941,890	6,465,897		143,503
359,346	23,715	15,052,867	33,362	219,261	324		1,752,490,909		309,258,126	27,636,148
109,698	6,397	1,223,809	205,188	22,255	254	67,146	7,535,324	11,323,313		173,078
28,097			1,474				74,054,109		94,972,298	16,069,530
8,525			7,261				910,348	3,595,416		200,171
12,867	171				71,046		6,654			
3,448	51				30,216		96	33,811		
30,033	250	755,571	796		4,079,861		2,061,195		5,015	
8,144	72	55,019	3,870		195,751		21,757	363,998		
70,997	421	755,571	2,270		4,150,907		76,121,958		94,977,313	16,069,530
20,117	123	55,019	11,131		225,967		932,201	3,993,225		200,171
54,393	5,360	3,195					68,657,357			
9,550	1,152	272					733,380	1,133,737		
14,365	675	898	62							
3,392	145	142	250			18		8,575		
101,897	1,060	157,981	3		8,010		4,365,313			
23,896	229	10,435	30		3,694		77,980	201,409		
	200	800	1,046				209,647			
	26	100	7,880				4,193	13,929		
80			3				7,900			
22			17					1,102		
7,106	622		25				364,500		285,448	
1,600	144		65				9,848	27,070		
		63,737					732,256		74,020	
		5,408					8,659	197,313		
							1,429,937			
							14,299	16,369		
58,140	1,179	895,572	1,763	23,325			1,164,807		101,760	
12,140	313	76,056	6,089	1,866			10,727	188,449		
440			53				10,048			
110			200				502	4,305		
236,481	9,096	1,122,183	2,955	23,325	8,010		76,941,765		461,228	
60,710	2,009	92,413	14,551	1,866	3,694	18	859,667	1,792,258		
22,093	2,503	29,350					190,209,859		16,621,080	
5,558	502	3,816					803,016	4,120,367		
56,850	1,740	236,109	53,259		520,376		18,202,764		53,590	
12,946	513	28,407	243,760		20,628		268,088	1,922,606		
3,328	230	554,995	49,170	201,350	13,426		8,508,929		115,900	
753	55	18,189	201,820	16,108	8,056	6,417	60,265	886,354		
85,049	565	8,802					6,422,128			
21,719	139	896					74,654	331,010		
185,656	2,492	342,902	3,112				22,184,307		1,300,657	
43,908	594	30,145	16,889				396,125	697,060		
352,956	7,530	1,172,158	105,541	201,350	533,802		245,527,957		18,091,227	
84,884	1,803	81,453	462,469	16,108	25,684	6,417	1,602,148	7,957,397		
1,019,720	40,762	18,102,779	144,128	443,936	4,693,043		2,151,032,619		422,787,894	43,705,678
265,409	10,332	1,452,694	693,319	40,229	258,599	73,581	10,929,340	25,066,193		373,249

Table 32.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
Nova Scotia.....Quantity	543,300	5				2,660
\$	2,092,293	75				13,280
New Brunswick.....Quantity	18,004					28
\$	97,437					340
Quebec.....Quantity	340,148	127,046	20,082		1	12,658
\$	2,012,144	939,007	134,656		16	134,480
Ontario.....Quantity	1,483	807,713	3,753		2	13,546
\$	9,300	4,622,410	29,251		26	100,794
Manitoba.....Quantity	1,945	68,035	160	126		570
\$	17,638	560,154	1,600	1,058		6,952
Saskatchewan.....Quantity	7,233			56,108		
\$	63,738			80,870		
Alberta.....Quantity	176,747			140,196		4
\$	622,854			189,351		40
British Columbia.....Quantity	325,672	152	189	157	111	4,260
\$	1,502,001	2,451	2,940	1,338	1,177	44,106
Yukon.....Quantity	3					
\$	15					
Canada.....Quantity	1,414,535	1,002,951	24,184	196,587	114	33,726
\$	6,417,420	6,124,097	168,447	272,617	1,219	299,992

Table 33.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
Nova Scotia.....Quantity	475,556	16				2,826
\$	1,753,470	80				16,900
New Brunswick.....Quantity	15,023			20		
\$	85,882			160		
Quebec.....Quantity	310,293	68,092	20,133	459		9,583
\$	1,765,007	463,506	143,160	2,983		99,174
Ontario.....Quantity	321	737,279	17,015		874	12,356
\$	3,128	3,955,171	119,247		5,303	91,556
Manitoba.....Quantity	6,425	59,741	10	131		556
\$	57,896	493,853	105	1,183		6,958
Saskatchewan.....Quantity	4,955			56,852		
\$	43,506			93,181		
Alberta.....Quantity	188,390			98,640		
\$	654,776			91,168		
British Columbia.....Quantity	310,045	102	10	584		3,545
\$	1,352,231	1,883	200	3,922		36,951
Yukon.....Quantity	50					
\$	150					
Canada.....Quantity	1,311,058	865,239	37,168	156,686	874	28,866
\$	5,716,046	4,914,493	262,712	192,597	5,303	251,539

Industry in Canada, by Provinces, 1929

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
150,206 38,036	1,409 358	104,756 12,434	5,422 23,097	395,759 31,661	.....	.....	9,822,335 224,903	.....	81,274,632	3,761,935 27,169
4,856 1,349	786 230	18,823 2,183	15,752 60,432	.....	12,680 3,240	.....	120,528 3,619	.....	1,066,000	.....
193,231 60,281	18,124 4,627	631,740 85,218	48,917 242,869	.....	.....	.....	774,496,590 3,090,306	.....	154,606,482	.....
258,930 69,423	70,190 12,110	10,058,639 815,179	70,121 367,068	.....	84,101 42,644	26,194	609,016,141 3,671,798	.....	14,590,545	2,805,900 28,059
48,685 17,230	2,584 865	180,000 55,886	32,135 172,128	.....	.....	.....	21,099,216 158,845	.....	.....	.....
9,332 2,668	2,000 600	273,272 22,527	444 1,698	.....	.....	.....	48,631 1,546	.....	1,050,000	.....
51,738 16,034	1,971 564	342,320 26,027	4,940 22,226	.....	6,412,116 203,548	.....	39,269,164 395,824	.....	13,022,478	1,264,252 36,252
210,771 69,423	3,269 1,220	5,838,612 348,525	35,884 128,650	282,531 34,751	.....	1,170	600,539,053 2,806,193	.....	75,377,897	31,927,736 253,649
16,424 13,343	.....	135,198 64,008	1,579 12,698	.....	.....	.....	.....	.....	10,056,413	2,365,008 23,650
944,173 287,817	100,333 20,604	17,583,360 1,431,987	215,194 1,030,866	678,290 66,412	6,508,897 249,432	27,641	2,054,411,658 10,353,034	.....	351,044,447	42,124,831 368,779

Industry in Canada, by Provinces, 1930

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
98,821 23,254	916 204	164,071 21,226	5,713 22,121	224,675 17,974	.....	.....	43,636,373 554,886	.....	64,166,034	12,051,011 121,772
4,048 997	471 141	22,952 2,473	13,382 52,123	.....	24,991 10,448	.....	221,342 10,367	.....	600,480	.....
232,875 56,094	12,304 2,818	548,178 68,166	24,368 127,691	17 54	.....	4,557	780,665,183 3,152,390	.....	223,750,883	.....
288,689 66,816	15,865 3,783	9,467,706 768,131	55,209 302,968	13 278	68,433 36,653	42,071	614,035,869 3,627,547	.....	17,994,157	.....
151,469 42,559	5,570 1,613	188,567 39,507	18,035 90,901	.....	.....	.....	49,254,487 470,713	.....	2,457,000	.....
42,316 12,069	2,191 632	866,633 74,016	965 3,505	.....	.....	.....	120,904 2,851	.....	300,000	.....
51,577 14,565	250 72	755,571 55,019	4,314 19,544	.....	4,599,619 211,498	.....	30,658,113 360,494	.....	12,210,426	2,136,398 40,757
146,709 46,489	3,147 989	5,929,047 348,260	21,572 62,324	219,231 21,923	.....	26,953	632,490,348 2,750,092	.....	88,596,733	26,684,069 182,378
3,216 2,566	48 80	160,054 75,896	570 12,142	.....	.....	.....	.....	.....	12,712,181	2,834,200 28,342
1,019,720 265,409	40,762 10,332	18,102,779 1,452,694	144,128 693,319	443,936 40,229	4,693,043 258,599	73,581	2,151,082,619 10,929,340	.....	422,787,894	43,705,678 373,249

Table 34.—Power Employed in the Mineral Industry in Canada, by Provinces, 1930, with Comparative Totals for 1929

Province	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
Nova Scotia.....No.	95	64	3	162	230	392	443	673	177
H.P.	57,834	4,119	225	62,178	6,994	69,172	45,457	52,451	38,145
New Brunswick.....No.	47	36		83	35	118	28	63	39
H.P.	2,585	620		3,205	552	3,757	943	1,495	1,914
Quebec.....No.	62	75	16	153	2,810	2,963	44	2,854	118
H.P.	3,361	4,068	51,605	59,034	119,703	178,737	1,069	120,772	9,218
Ontario.....No.	222	265	11	498	5,155	5,653	561	5,716	205
H.P.	18,100	11,018	5,406	34,524	245,159	279,683	12,984	258,143	22,287
Manitoba.....No.	27	14		41	1,336	1,377	34	1,370	22
H.P.	4,044	869		4,913	48,937	53,850	454	49,391	1,165
Saskatchewan.....No.	45	8		53	58	111	69	127	31
H.P.	3,059	620		3,679	1,553	5,232	781	2,334	3,454
Alberta.....No.	277	119		396	817	1,213	392	1,209	302
H.P.	37,246	5,100		42,346	28,151	70,497	12,030	40,181	35,432
British Columbia...No.	158	104	67	329	2,812	3,141	936	3,748	163
H.P.	39,248	7,529	43,435	90,212	161,962	252,174	36,033	197,995	30,319
Yukon.....No.	6	10	2	18	32	50		32	9
H.P.	84	785	10,000	10,869	451	11,320		451	258
Canada, 1930.....No.	939	695	99	1,733	13,285	15,018	2,507	15,792	1,066
H.P.	165,561	34,728	110,671	310,960	613,462	924,422	109,751	723,213	142,192
Canada, 1929.....No.	1,004	684	111	1,799	10,572	12,371	2,069	12,641	1,110
H.P.	165,595	29,101	111,204	305,900	523,432	829,332	92,912	616,344	145,294

Table 35.—Power Employed in the Mineral Industry in Canada by Industries, 1930, with Comparative Totals for 1929

Industry	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
METAL MINING—									
*Alluvial Gold....No.	12	16	2	30		30			7
H.P.	309	373	10,000	10,682		10,682			138
Auriferous Quartz.No.	16	47	9	72	1,568	1,640	241	1,809	69
H.P.	1,294	7,716	3,246	12,256	73,918	86,174	5,545	79,463	5,747
Copper-Gold-Silver									
No.	6	16	12	34	1,718	1,752	146	1,864	28
H.P.	3,224	1,614	9,990	14,828	68,368	83,196	5,471	73,839	1,676
Silver-Cobalt....No.	3			3	157	160		167	13
H.P.	235			235	6,405	6,640		6,405	795
Silver-Lead-Zinc.No.	24	66	19	109	474	583	102	676	25
H.P.	7,512	5,393	3,204	16,109	14,949	31,058	2,268	17,817	3,982
Nickel-Copper....No.					306	306		306	1
H.P.					26,363	26,363		26,363	60
Miscellaneous....No.	3	3		6		6			1
H.P.	210	30		240		240			25
Non-Ferrous Smelting and Refining....No.	29	9	21	59	4,130	4,189	619	4,749	48
H.P.	16,513	380	65,035	81,928	215,874	297,802	15,140	231,014	18,248
Total.....No.	93	157	63	313	8,353	8,666	1,108	9,461	192
H.P.	29,297	15,506	91,475	136,278	405,877	542,155	28,424	434,301	30,671
NON-METAL MINING INCLUDING FUELS—									
<i>Fuels</i>									
Coal.....No.	425	55	2	482	903	1,385	1,001	1,904	442
H.P.	110,873	452	12,000	123,325	28,842	152,167	70,593	99,435	75,768
Natural Gas.....No.	7	138		145	6	151	13	19	7
H.P.	193	2,552		2,745	33	2,778	202	235	310
Petroleum.....No.	73	77		150	66	216	26	92	122
H.P.	4,515	4,520		9,035	520	9,555	356	876	9,544
Total.....No.	505	270	2	777	976	1,752	1,040	2,015	571
H.P.	115,681	7,524	12,000	135,105	29,396	164,500	71,151	100,546	85,622
<i>Other Non-Metal Mining</i>									
Abrasives.....No.	6	1		7	3	10		3	6
H.P.	361	30		391	13	404		13	425
Asbestos.....No.	5	4		9	682	691		682	8
H.P.	1,120	179		1,299	41,691	42,990		41,691	1,230
Feldspar.....No.	7	8		15		15			6
H.P.	91	167		258		258			240
Gypsum.....No.	8	50		58	178	236	21	199	7
H.P.	925	2,695		3,620	6,170	9,790	1,043	7,213	590
Iron Oxides.....No.					5			5	1
H.P.					128	128		128	15
Mica.....No.					3	3		3	1
H.P.					3	3		3	35
Quartz.....No.	10	2		12	19	31		19	5
H.P.	407	46		453	373	826		373	525
Salt.....No.	7	4		11	31	42	106	137	12
H.P.	140	375		515	366	881	1,246	1,612	3,615
Talc and Soapstone.....No.					17	17		17	
H.P.					1,536	1,536		1,536	
Miscellaneous....No.	6	11	1	18	6	24	46	56	11
H.P.	347	663	100	1,110	262	1,372	485	747	790
Total.....No.	49	80	1	130	944	1,074	173	1,117	57
H.P.	3,591	4,155	100	7,646	50,642	58,188	2,774	53,316	7,465
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—									
Cement.....No.	2	8	9	19	1,237	1,256	70	1,307	13
H.P.	2,000	278	5,336	7,614	73,295	80,909	2,800	76,095	3,537
Clay Products....No.	90	53		143	608	751	19	627	89
H.P.	6,844	1,775		8,619	20,672	29,291	1,302	21,974	7,618
Lime.....No.	16	10	2	28	268	296	40	308	27
H.P.	645	388	70	1,103	5,429	6,532	678	6,107	2,014
Sand and Gravel.No.	36	20	5	61	153	214	7	160	13
H.P.	1,551	518	350	2,419	4,412	6,831	235	4,617	515
Stone.....No.	148	97	17	262	747	1,009	50	737	99
H.P.	6,252	4,584	1,340	12,176	23,840	36,016	2,387	26,227	4,750
Total.....No.	292	188	33	513	3,013	3,526	156	3,199	246
H.P.	17,292	7,543	7,096	31,931	127,648	159,579	7,402	135,050	18,434
Grand total 1930...No.	939	695	99	1,733	13,285	15,018	2,507	15,792	1,066
H.P.	165,561	34,728	110,671	310,960	613,462	924,422	109,751	723,213	142,192
Grand total 1929...No.	1,004	684	111	1,799	10,572	12,371	2,069	12,641	1,110
H.P.	165,595	29,101	111,204	305,900	523,432	829,332	92,912	616,344	145,294

*Electricity also generated, used largely for lighting purposes.

Table 36.—Principal Imports into Canada of Mineral and Chemical Products during Calendar Years 1929 and 1930

Classification	1929		1930	
	Quantity	Value \$	Quantity	Value \$
IRON AND ITS PRODUCTS—				
Iron ore..... tons	2,447,807	5,026,265	1,485,429	3,324,190
Pigs, Ingots, Blooms and Billets—				
Pig iron..... tons	36,454	624,891	15,280	270,157
Ferro-silicon and ferro-manganese..... cwt.	183,176	587,152	87,489	346,541
Billets, not less than 60 lb. per lineal yard..... cwt.	401,470	691,742	80,498	197,741
Other pigs, ingots, blooms and billets..... cwt.	409,021	925,043	159,555	492,748
Total pigs, ingots, blooms and billets.....		2,828,828		1,307,187
Scrap iron or steel..... tons	121,294	1,367,179	119,074	1,222,940
Castings and Forgings—				
Axles, parts and blanks.....		1,393,631		482,065
Locomotive and car wheel tires..... cwt.	226,797	1,043,195	144,849	642,842
Other castings and forgings.....		3,386,452		1,697,943
Total castings and forgings.....		5,823,278		2,822,550
Rolling Mill Products—				
Band and hoop..... cwt.	1,499,337	5,204,502	703,252	2,803,923
Bars and Rails—				
Railway rails..... tons	28,379	944,965	16,804	554,491
Other bars and rails..... cwt.	3,568,402	9,376,514	1,654,433	4,304,669
Plates and Sheets—				
Boiler plate..... cwt.	239,293	614,819	177,786	416,045
Canada plates..... cwt.	135,232	504,017	15,806	64,681
Tinned plates..... cwt.	1,645,766	8,200,692	1,987,058	9,833,026
Plates not less than 30 in. by 1 in., n.o.p..... cwt.	2,102,547	3,993,352	530,256	985,454
Sheets, No. 14 gauge and thinner, n.o.p..... cwt.	1,633,126	5,733,489	1,209,668	4,086,154
Galvanized, flat..... cwt.	670,823	2,549,090	616,530	2,215,395
Galvanized, other..... cwt.	6,593	21,103	16,806	101,807
Skelp, for pipe, etc..... cwt.	3,135,813	5,890,497	2,743,635	4,968,199
Other plates and sheets..... cwt.	1,993,300	4,752,672	3,180,600	7,449,248
Rods..... cwt.	999,991	1,663,801	716,115	1,150,159
Flat eye-bar blanks..... tons	287	11,295	10	401
Bridges.....		179,293		123,532
Other structural iron..... tons	380,403	15,106,537	192,979	7,374,695
Total rolling mill products.....		64,746,638		46,481,879
Tubes, Pipes and Fittings—				
Boiler tubes.....		1,164,570		1,008,597
Cast iron pipe..... tons	5,063	209,703	9,650	305,132
Seamless tubing, not less 3½c. per lb..... cwt.	102,635	749,349	25,545	195,644
Other tubes, pipes, etc.....		3,899,866		2,593,316
Total tubes, pipes and fittings.....		6,023,488		4,102,689
Wire—				
Barbed fencing..... cwt.	94,781	297,883	103,636	308,557
Galvanized, No. 9, 12 and 13 gauge, not telegraph or telephone..... cwt.	141,996	360,178	72,130	190,775
Steel wire for rope..... cwt.	180,006	1,134,313	135,717	862,631
Wire rope, twisted wire, clothes lines, wire cable, etc., n.o.p.....		490,577		406,576
Other.....		1,545,435		963,306
Total wire.....		3,828,386		2,731,845
Chains.....		1,043,015		604,881
Engines and Boilers—				
Engines, automobile..... No.	88,841	9,183,357	33,214	5,141,600
Engines, internal combustion, other..... No.	14,704	2,315,831	7,081	1,246,230
Locomotives and parts..... No.	214	773,807	116	807,209
Other boilers, engines, etc.....		5,501,354		3,632,313
Total engines and boilers.....		17,774,349		10,827,352
Farm Implements and Machinery—				
Cream separators..... No.	18,269	793,338	26,407	1,243,649
Other dairy machinery.....		231,705		208,995
Harvesters..... No.	5,286	5,016,421	3,150	1,724,231
Other harvesting implements and machinery.....		441,172		476,674
Planting and Tillage—				
Drills and parts..... No.	6,327	986,456	4,305	653,622
Ploughs and parts.....		2,228,598		1,797,886
Other planting.....		1,085,506		851,851

Table 36.—Principal Imports into Canada of Mineral and Chemical Products during Calendar Years 1929 and 1930—Continued

Classification	1929		1930	
	Quantity	Value \$	Quantity	Value \$
IRON AND ITS PRODUCTS—Concluded				
Farm Implements and Machinery—Concluded				
Seed Separation—				
Threshing machine separators..... No.	1,988	2,160,705	2,304	2,846,416
Threshing machine separator parts.....		634,379		242,397
Fanning mills..... No.	1,321	30,616	582	39,046
Traction engines for farm purposes—				
Not over \$1,400 each..... No.	16,690	13,970,943	10,912	8,232,141
Other..... No.	283	547,094	311	624,172
Farm tractor parts and repairs.....		2,271,479		1,879,020
Other farm implements.....		1,446,914		1,124,131
Total farm implements and machinery.....		31,845,326		21,944,231
Hardware and Cutlery—				
Cutlery.....		1,652,191		1,358,523
Hardware—				
Nails, wire of all kinds, n.o.p.*..... cwt.	13,002	46,985	3,174	11,410
Other nails, spikes, tacks.....		78,403		60,094
Needles and pins.....		520,699		445,527
Nuts and bolts..... cwt.	52,334	578,066	39,829	413,529
Screws.....		251,471		152,190
Other hardware, n.o.p.....		1,983,766		1,298,433
Total hardware and cutlery.....		5,111,581		3,739,706
Machinery (Except Agricultural)—				
Sewing machines..... No.	23,285	708,745	16,500	507,363
Sewing machine parts and attachments.....		477,216		298,845
Washing machines, domestic..... No.	24,746	1,701,999	17,358	1,181,242
Other household machinery.....		309,287		737,590
Rock drills, n.o.p., for mining only..... No.	1,072	864,911	420	564,167
Other mining and metallurgical.....		9,935,397		6,635,081
Office or Business—				
Adding..... No.	8,732	1,257,536	5,947	683,038
Typewriting..... No.	21,336	1,062,329	13,662	696,332
Other.....		799,590		734,244
Printing and Bookbinding—				
Printing presses.....		2,597,365		1,584,146
Typesetting machines.....		1,139,559		783,588
Other printing and bookbinding.....		1,027,573		957,595
Coke and gas machinery.....		393,580		434,672
Cranes and derricks..... No.	477	1,669,918	202	994,550
Logging equipment.....		1,458,092		569,428
Metal-working, n.o.p.....		5,112,082		3,831,756
Paper and pulp mill.....		1,460,640		1,176,964
Pumps, power, and parts..... No.	10,476	1,758,110	7,921	1,202,146
Rolling mill machines.....		1,050,618		480,544
Shovels, steam, electric or other power..... No.	184	1,810,461	86	1,741,821
Textile.....		6,646,316		4,017,269
Other machinery.....		26,315,912		20,404,518
Total machinery (except agricultural).....		69,557,236		50,216,899
Springs.....		313,359		190,563
Stamped and Coated Products—				
Tin cans.....		644,075		555,907
Other.....		1,986,528		1,891,230
Tools and hand implements.....		3,381,654		2,351,031
Vehicles—				
Automobiles, freight..... No.	5,278	6,817,176	3,550	4,662,406
Automobiles, passenger..... No.	39,446	32,605,958	19,683	15,897,881
Automobile parts.....		44,772,091		23,358,763
Railway cars, all kinds..... No.	1,129	805,976	1,322	572,035
Railway cars, parts of.....		2,046,615		1,403,205
Other vehicles of iron.....		2,180,501		1,887,086
Total vehicles.....		89,228,317		47,781,376
Drums, tanks, cylinders.....		1,791,942		1,310,479
Furniture.....		1,551,060		1,125,754
Plates for agricultural implements..... cwt.	10,588	45,894	5,564	28,232
Pumps, hand or power—water..... No.	59,858	592,384	15,338	217,826
Stoves.....		837,471		1,494,697
Valves, n.o.p.....		1,364,147		1,089,353
Articles for shipbuilding.....		2,337,622		1,557,476
Other iron and steel.....		23,430,405		16,147,778
Total iron and its products.....		342,480,427		225,068,051

*January 1 to March 31, 1930.

Table 36.—Principal Imports into Canada of Mineral and Chemical Products during Calendar Years 1929 and 1930—Continued

Classification	1929		1930	
	Quantity	Value \$	Quantity	Value \$
NON-FERROUS METALS—				
Alumina and bauxite..... cwt.	2,853,874	3,227,754	2,137,447	3,083,092
Cryolite..... cwt.	48,019	194,638	47,559	201,355
Aluminium ingots, sheets..... lb.	1,552,048	471,427	3,957,192	961,156
Other aluminium.....		2,143,475		2,050,669
Brass—				
Scrap..... cwt.	47,802	617,492	18,089	206,535
Bars and rods in coils, not less than 6' long..... cwt.	10,217	202,910	7,297	142,531
Strips, sheets plates, not polished..... cwt.	11,053	265,925	10,184	205,893
Tubing, not polished or bent..... lb.	4,074,669	1,020,931	3,628,084	766,872
Wire, plain..... lb.	471,797	138,000	528,775	127,943
Wire cloth.....		63,895		47,027
Other.....		5,046,927		3,937,653
Total brass.....		7,356,080		5,434,454
Copper—				
Blocks, pigs, ingots..... cwt.	120,840	2,246,600	78,672	1,022,936
Scrap..... cwt.	49,583	827,832	14,437	173,114
Bars and rods..... cwt.	555,438	10,086,738	325,026	4,674,059
Strips, sheets, plates..... cwt.	28,063	698,974	18,447	410,565
Tubing, not less than 6 feet..... lb.	2,662,706	721,369	1,895,872	442,842
Other.....		2,438,281		1,594,634
Total copper.....		17,019,794		8,318,150
Lead—				
Pigs, bars and sheets..... lb.	1,426,840	84,922	2,274,903	127,678
Other.....		301,893		269,385
Nickel—				
Bars, rods, sheets, etc..... lb.	1,243,865	388,296	1,120,122	347,461
Nickel-plated ware.....		3,319,624		2,022,799
Other.....		782,345		596,645
Precious Metals—				
Electro-plated ware.....		1,410,202		1,014,645
Silver in bars, blocks, etc.....		958,312		610,634
Other.....		877,327		538,860
Tin—				
Blocks, bars, pigs..... cwt.	57,145	2,670,819	52,737	1,757,494
Foil..... lb.	102,152	55,092	74,470	35,633
Other (collapsible tubes).....		49,841		61,404
Zinc—				
Spelter..... lb.	2,658,483	165,566	1,860,276	90,270
Sheets and plates for marine boilers..... lb.	10,628,131	787,152	6,024,973	410,467
Other.....		206,966		323,564
Phosphor tin and bronze..... lb.	841,824	340,660	707,863	259,928
Other alloys, n.o.p.....		50,186		40,617
Clocks and watches.....		3,608,898		2,759,357
Electric Apparatus—				
Batteries, storage..... No.	23,369	573,295	15,071	658,657
Dynamos, generators.....		2,093,353		1,939,152
Incandescent lamps—				
Carbon filament..... No.	1,403,651	131,070	1,573,899	124,171
Metal filament..... No.	695,928	87,902	494,824	44,239
Electric light fixtures.....		1,217,435		1,041,713
Meters.....		397,680		367,443
Motors.....		4,945,818		3,210,245
Spark plugs, etc.....		1,280,590		710,860
Switches, etc.....		2,236,688		2,138,649
Telegraph instruments.....		622,775		463,628
Telephone instruments.....		2,716,807		2,931,927
Wireless and radio apparatus and parts, n.o.p.....		10,198,060		7,759,532
Other.....		10,338,060		8,891,297
Total electric apparatus.....		36,839,533		30,281,514
Gas apparatus.....		298,289		232,355
Printing materials (except machinery)—				
Stereotypes.....sq. in.	6,105,678	351,776	5,919,074	360,304
Other.....		123,828		95,793
Manganese oxide..... cwt.	1,982,782	990,608	1,975,551	992,485
Ores, n.o.p..... cwt.	208,919	358,639	141,683	283,362
Antimony, not ground..... lb.	1,746,525	147,643	1,303,560	87,027
Mercury..... lb.	346,701	478,048	105,755	153,837
Lamps, sidelights, etc.....		1,737,881		832,980
Other non-ferrous metals.....		2,888,760		2,291,541
Total non-ferrous metals.....		90,686,274		66,926,975

Table 36.—Principal Imports into Canada of Mineral and Chemical Products during Calendar Years 1929 and 1930—Continued

Classification	1929		1930	
	Quantity	Value	Quantity	Value
		\$		\$
Non-METALLIC MINERALS—				
Asbestos other than crude.....		1,013,436		873,850
Clay and Clay Products—				
China clay..... cwt.	497,571	292,980	462,245	278,757
Fireclay..... cwt.	1,521,282	322,508	1,147,387	240,293
*Other clays.....		167,641		170,710
Bricks, building..... M	15,678	291,370	11,707	255,515
Bricks, fire.....		2,565,114		2,074,482
Brick and tile, n.o.p.....		1,240,131		983,333
Pottery and chinaware.....		5,484,104		4,640,399
Artificial teeth.....		461,832		412,925
Bath tubs, etc.....		638,874		574,881
Other.....		695,012		553,386
Total clay and clay products.....		12,159,566		10,196,681
Coal and Coal Products—				
Coal, anthracite..... tons	4,019,917	28,809,792	4,256,090	30,098,910
Coal, bituminous..... tons	13,707,543	26,259,704	14,146,070	25,858,254
Coal for ships' stores..... tons	462,595	881,264	351,885	664,511
Coal tar, crude, includes pitch..... gal.	6,429,566	518,878	4,965,646	343,748
Carbolic oil..... gal.	2,398,042	445,321	2,358,516	380,039
Coke..... tons	1,226,853	6,659,514	1,061,040	5,611,897
Lignite and coal products, n.o.p.....		77,852		96,006
Total coal and coal products.....		63,652,325		63,053,365
Glass and Glassware—				
Carboys, bottles, jars, etc. (including milk bottles).....		1,714,746		1,465,051
Tableware.....		1,110,456		1,017,134
Incandescent lamp bulbs and tubing for.....		595,113		507,767
Common window glass..... sq. ft.	51,389,896	1,550,939	36,946,036	1,213,950
Plate glass—				
Not over 7 sq. ft., n.o.p..... sq. ft.	5,004,282	1,433,703	2,630,838	851,356
7 to 25 sq. ft..... sq. ft.	1,060,294	383,250	777,104	327,124
Plate glass, n.o.p..... sq. ft.	1,600,167	628,166	969,129	418,585
Other glass and glassware.....		3,153,084		2,483,774
Total glass and glassware.....		10,569,457		8,284,741
Graphite and products.....		155,770		116,233
Petroleum, Asphalt and Their Products—				
Asphalt, solid..... cwt.	1,075,002	829,328	855,834	650,837
Other asphalt and oil.....		123,152		168,588
Crude Petroleum—Natural, for refining..... gal.	1,060,000,971	46,154,347	1,012,029,544	38,241,270
Crude petroleum not in its natural state, -725 to -770 sp. gr. at 60°..... gal.	5,726,147	376,001	8,466,369	600,899
Petroleum not including crude for refining -8235 sp. gr. at 60°..... gal.	63,264,841	2,444,259	65,733,147	2,406,223
Fuel oil ex-warehoused for ships' stores..... gal.	32,302,642	868,925	31,650,548	821,313
Coal and kerosene oil, refined..... gal.	4,523,347	399,724	4,976,204	370,374
Gasoline—				
Under -725 specific gravity..... gal.	135,558,699	15,096,277	93,822,017	9,488,190
Other..... gal.	39,592,871	4,707,809	69,624,531	7,626,311
Lubricating oil..... gal.	17,404,194	5,444,947	16,309,806	5,017,752
Other oils, n.o.p..... gal.	531,205	242,537	991,752	249,819
Other petroleum products.....		1,152,104		978,073
Total petroleum, asphalt and their products.....		77,839,410		66,619,649
Stone and Its Products—				
Abrasives.....		4,508,916		2,651,789
Building and paving stone.....		894,118		763,534
Cement..... cwt.	195,929	189,169	502,026	569,848
Silica sand..... cwt.	4,679,252	490,558	3,286,984	352,796
Whiting..... cwt.	350,098	203,035	258,558	146,785
Marble, slate and other.....		2,774,122		2,574,671
Total stone and its products.....		9,059,918		7,059,423
Miscellaneous—				
Carbons, electric.....		473,383		459,129
Diamonds, unset.....		3,633,830		2,014,713
Insulators, electric.....		465,578		452,335
Salt..... cwt.	3,531,300	936,820	2,567,723	660,903
Sulphur..... cwt.	4,698,520	3,789,243	3,594,561	3,177,492
Other non-metallic minerals.....		2,173,063		1,880,206
Total non-metallic minerals.....		185,921,799		164,848,720

*Includes in 1931 a value of \$11,798 of Zirconium compounds.

Table 36.—Principal Imports into Canada of Mineral and Chemical Products during Calendar Years 1929 and 1930—Concluded

Classification	1929		1930	
	Quantity	Value	Quantity	Value
		\$		\$
CHEMICALS AND ALLIED PRODUCTS—				
Acid, citric..... lb.	322,494	150,497	366,132	141,363
Acid, stearic..... lb.	2,166,794	275,818	1,980,245	203,209
Other acids.....		804,984		720,507
Alcohols, industrial..... gal.	38,651	66,392	31,940	63,704
Cellulose products.....		2,775,840		2,547,338
Drugs and medicinal preparations.....		3,730,193		3,652,371
Dyeing and Tanning Materials—				
Aniline and coal tar dyes..... lb.	3,024,189	1,813,606	3,105,838	1,926,136
Coal tar dye products, n.o.p..... lb.	923,261	167,214	792,284	162,196
Logwood, oak, quebracho extracts..... lb.	31,077,418	1,191,386	24,146,780	893,676
Other dyeing and tanning articles.....		475,320		390,427
Total dyeing and tanning materials.....		3,647,526		3,372,435
Explosives.....				
		587,311		437,801
Fertilizers, n.o.p.—				
Potash, muriate of..... cwt.	340,024	611,121	685,624	1,246,638
Soda nitrate..... cwt.	677,558	1,419,647	636,182	1,280,471
Superphosphates..... cwt.	1,958,501	1,147,839	2,557,822	1,393,862
Other.....		1,433,116		2,039,277
Total fertilizers, n.o.p.....		4,611,723		5,960,248
Paints, Pigments and Varnishes—				
Litharge..... cwt.	55,922	423,261	28,656	213,240
Lead, red..... lb.	1,791,872	134,685	1,352,076	110,075
Black, carbon..... lb.	14,620,572	1,014,140	12,264,785	603,742
Blacks, other..... lb.	1,444,378	111,466	1,102,434	83,803
Lithopone..... lb.	19,408,436	852,079	16,051,513	722,341
Oxide of cobalt, tin and copper, n.o.p..... lb.	288,694	124,748	243,409	77,612
Oxides, fireproofs..... lb.	7,365,868	790,654	6,783,962	697,331
Zinc white..... lb.	19,052,472	1,248,668	14,575,729	885,580
Liquid fillers, etc..... gal.	495,436	635,735	374,264	546,670
Varnish, lacquers, etc..... gal.	144,369	259,765	128,364	236,768
Other paints, etc., n.o.p.....		625,959		486,519
Total paints, pigments and varnishes.....		6,221,160		4,663,681
Perfumery, Cosmetics—				
Perfumes over 4 oz..... gal.	2,693	109,167	2,142	76,467
Other.....		1,388,371		1,191,502
Soap—				
Castile..... lb.	1,237,860	93,264	1,264,509	92,782
Common laundry..... lb.	11,485,386	860,509	10,187,490	757,624
Other.....		352,415		366,436
Inorganic Chemicals, n.o.p.—				
Alum in bulk..... cwt.	34,296	47,070	23,744	33,975
Sulphate of alumina..... cwt.	522,966	611,244	491,758	565,044
Ammonia, nitrate of..... lb.	4,989,868	187,433	5,732,867	209,061
Sal ammoniac..... lb.	3,455,465	135,585	2,941,546	109,353
Copper sulphate..... lb.	4,370,426	236,693	6,016,579	273,842
Chlorine, liquid..... lb.	7,042,430	120,128	7,451,358	187,618
Chloride of lime..... lb.	7,862,413	123,427	4,212,484	72,343
Potash compounds..... lb.	6,189,559	561,714	4,975,108	455,577
Soda compounds..... lb.	374,894,378	4,508,244	210,151,909	3,426,289
Acid phosphate..... lb.	2,982,679	223,157	2,526,468	179,996
Other.....		1,454,915		1,849,825
Total inorganic chemicals, n.o.p.....		8,299,610		7,362,923
Other Drugs, Dyes and Chemicals—				
Glycerine..... lb.	8,328,212	736,747	8,919,706	726,420
Other chemicals and allied products.....		5,421,509		4,448,239
Total chemicals and allied products.....		40,131,178		36,785,050

Table 37.—Principal Exports of Canadian Mineral and Chemical Products during the Calendar Years 1929 and 1930

Classification		1929		1930	
		Quantity	Value	Quantity	Value
			\$		\$
IRON AND ITS PRODUCTS—					
Ore, including chromite.....	tons	3,859	19,461	558	3,025
Pigs, Ingots, Blooms and Billets—					
Pig iron.....	tons	8,375	151,967	664	12,653
Ferro-manganese and ferro-silicon.....	tons	69,099	4,816,930	43,516	2,694,493
Billets, ingots and blooms.....	tons	520	14,558	2,154	54,441
Total pigs, ingots, blooms and billets.....			4,983,455		2,761,587
Scrap iron.....	tons	138,372	1,583,830	43,446	416,579
Castings of iron and steel, n.o.p.....	cwt.	43,668	260,049	17,104	100,151
Forgings of iron and steel.....	cwt.	211	2,767	110	1,166
Rolling Mill Products—					
Bars and rods of iron and steel.....	tons	15,312	599,489	11,174	422,746
Plates and sheets of iron and steel.....	tons	138	12,014	148	9,446
Rails of iron and steel.....	tons	19,678	659,940	19,828	570,733
Structural steel.....	tons	812	115,699	4,023	532,218
Total rolling mill products.....			1,387,142		1,535,143
Pipe and Tubing.....			2,567,033		1,666,211
Wire—					
Barbed of iron and steel.....	cwt.	31,236	110,385	13,390	46,934
Woven fencing.....			127,879		98,335
Other.....			738,356		491,196
Engines and Boilers—					
Locomotives and parts.....	No.	2	114,913		11,535
Other.....			273,105		175,187
Farm Implements and Machinery—					
Cream separators.....			54,692		22,867
Milking machines and parts.....			696,730		342,299
Harvesters.....	No.	14,348	2,455,601	8,864	1,698,353
Hay rakes.....	No.	4,994	189,190	2,033	68,906
Mowing machines.....	No.	13,142	788,247	8,559	524,837
Reapers.....	No.	393	29,584	31	2,866
Reaper threshers.....	No.	3,263	3,532,678	377	481,648
Cultivators.....	No.	17,529	625,348	10,040	513,892
Drills.....	No.	5,945	980,675	3,204	503,948
Harrow.....			610,754		190,499
Ploughs.....			4,821,266		2,369,684
Threshing machines.....			572,046		429,730
Spades and shovels.....	doz.	24,485	216,584	20,126	175,312
Other.....			959,742		891,704
Parts.....			3,302,606		2,085,859
Total farm implements and machinery.....			19,835,746		10,302,404
Hardware and Cutlery—					
Razors and razor blades.....			563,174		620,096
Nails, wire.....	cwt.	60,166	211,265	35,934	128,204
Nails, brads, spikes and tacks of iron and steel, n.o.p.....	cwt.	23,821	145,169	23,588	134,854
Needles and pins.....			525,157		428,322
Bolts and nuts of iron and steel.....	cwt.	9,792	68,200	8,093	60,065
Other hardware.....			303,561		315,765
Machinery—					
Electric vacuum cleaners and parts.....	No.	44,956	1,909,921	56,092	2,232,011
Sewing machines.....			3,452,283		2,106,224
Adding and calculating machines and parts.....	No.	4,164	408,645	1,899	205,148
Typewriters and parts.....	No.	1,384	78,120	1,383	81,807
Metal-working.....			70,352		29,143
Wood-working.....			63,976		43,469
Other machinery.....			1,162,787		1,411,016
Total machinery.....			7,146,084		6,108,818
Axes.....	doz.	4,304	36,973	3,301	28,991
Tools, hand or machine.....			253,818		160,033
Vehicles—					
Automobiles, freight—					
One ton or less capacity.....	No.	25,040	9,749,435	6,077	2,118,695
Over one ton capacity.....	No.	11,808	5,081,571	9,635	3,942,304
Automobiles, passenger—					
\$500 or less.....	No.	45,852	17,325,333	21,443	7,987,777
\$500 to \$1,000.....	No.	17,873	11,120,159	7,202	4,499,851
Over \$1,000.....	No.	1,138	1,378,941	196	250,156
Total automobiles.....	No.		44,655,439		18,798,783

Table 37.—Principal Exports of Canadian Mineral and Chemical Products during the Calendar Years 1929 and 1930—Continued

Classification	1929		1930	
	Quantity	Value \$	Quantity	Value \$
IRON AND ITS PRODUCTS—Concluded				
Vehicles—Concluded				
Automobile parts.....		2,350,232		1,587,571
Railway cars and parts.....		32,337		205,723
Tractors and parts..... No.	12	13,913	11	20,782
Other vehicles of iron.....		102,444		72,323
Total vehicles.....		47,154,365		20,685,182
Chains.....		172,434		112,534
Stoves.....		156,852		107,136
Other iron and steel.....		1,360,392		1,068,072
Total iron and its products.....		90,101,565		47,565,525
NON-FERROUS METALS—				
Aluminium—				
Scrap..... cwt.	34,162	455,326	27,506	381,408
Bars, blocks, etc..... cwt.	729,708	13,210,023	433,278	7,753,795
Manufactures.....		1,479,160		1,795,227
Brass—				
Old and scrap..... cwt.	119,185	1,206,510	61,759	485,478
Valves.....		282,429		220,253
Other.....		908,760		755,006
Copper—				
Fine, in ore, matte, regulus..... cwt.	869,991	8,944,965	748,046	7,236,456
Blister..... cwt.	1,482,785	26,711,867	1,475,214	22,428,176
Old and scrap..... cwt.	115,596	1,574,712	67,656	740,099
Bars, rods, strips, sheets, tubes and plates..... cwt.	1,321	35,900	69,592	827,944
Wire, insulated..... cwt.		119,030		111,678
Other.....		13,522		10,191
Total copper.....		37,399,996		31,354,544
Lead—				
In ore..... cwt.	159,768	1,047,441	263,232	1,258,272
In pigs, refined lead, etc. cwt.	2,283,741	10,053,402	2,054,326	7,015,308
Nickel—				
In ore, matte, speiss, etc..... cwt.	296,307	4,501,389	448,904	8,142,794
Nickel oxide..... cwt.	116,009	3,489,782	37,330	1,100,018
Fine..... cwt.	684,082	17,544,513	431,225	11,262,512
Precious Metals—				
Gold-bearing quartz, dust, etc.....		29,995,983		22,312,605
Silver in ore, concentrates, etc..... oz.	7,058,275	3,736,204	8,473,189	3,401,340
Silver bullion..... oz.	14,879,770	8,022,917	15,778,755	6,180,412
Other.....		649,161		2,006,977
Total precious metals.....		42,404,265		33,901,334
Zinc—				
Ore..... tons	12,869	1,415,725	23,482	1,014,915
Spelter..... cwt.	1,350,857	7,031,645	1,509,641	5,146,215
Scrap, dross and ashes..... cwt.	76,382	262,719	48,089	92,651
Clocks and watches.....		228,771		188,619
Miscellaneous—				
Electric apparatus.....		2,643,526		2,290,154
Cobalt contained in ore..... cwt.	3,793	484,491	3,996	442,423
Cobalt, metallic..... lb.	315,700	608,444	39,000	71,809
Ores, other, n.o.p..... tons	469	44,424	966	86,045
Other non-ferrous metals.....		1,461,397		1,007,846
Total non-ferrous metals.....		148,164,138		115,766,626
NON-METALLIC MINERALS—				
Asbestos..... tons	143,725	10,127,208	104,262	6,441,939
Asbestos sand and waste..... tons	148,305	2,507,474	131,238	2,011,318
Asbestos mfrs.....		113,952		199,783
Porcelain insulators.....		268,109		349,533
Other clay and products.....		107,397		99,587
Coal (incl. lignite)..... tons	842,972	4,375,328	624,512	3,345,998

Table 37.—Principal Exports of Canadian Mineral and Chemical Products during the Calendar Years 1929 and 1930—Concluded

Classification	1929		1930	
	Quantity	Value	Quantity	Value
		\$		\$
Non-Metallic Minerals—Con.				
Coal Products—				
Cinders.....		2,516		456
Coke..... tons	53,130	732,489	53,979	698,211
Tar and pitch (coal)..... gal.	3,069,247	140,541	4,555,899	182,478
Glass and glassware.....		100,507		150,759
Graphite or plumbago, crude and refined..... cwt.	31,643	88,647	48,351	127,291
Mica splittings..... cwt.	1,822	96,726	773	35,351
Other mica.....		116,333		51,186
Petroleum and its Products—				
Petroleum, crude..... gal.	28,177,495	1,548,288	19,259,585	881,452
Kerosene, refined..... gal.	1,367,241	137,160	1,460,676	138,455
Gasoline and naphtha..... gal.	4,669,078	875,027	7,256,557	1,226,561
Oil mineral, n.o.p..... gal.	433,634	105,426	315,779	120,231
Wax, mineral..... cwt.	11,556	62,171	16,958	74,933
Stone and its Products—				
Abrasives, artificial crude including carborundum..... cwt.	1,571,816	3,815,804	1,128,775	2,842,289
Grindstones.....		36,536		11,674
Gypsum, crude..... tons	893,445	1,086,939	719,381	871,567
Lime..... cwt.	484,769	428,209	447,288	444,728
Cement, portland..... cwt.	819,389	252,955	695,578	212,071
Feldspar..... tons	29,896	242,915	21,183	165,482
Sand and gravel..... tons	1,903,312	441,798	2,589,431	468,380
Talc..... cwt.	227,988	139,096	170,247	98,855
Other.....		564,765		490,347
Other non-metallic minerals.....		1,045,137		944,282
Total non-metallic minerals.....		29,559,453		22,685,197
CHEMICALS AND ALLIED PRODUCTS—				
Acid, sulphuric..... cwt.	167,938	91,634	11,418	6,530
Acids, other, n.o.p..... cwt.	583,682	4,782,526	372,869	2,809,918
Wood alcohol..... gal.	31,193	30,092	9,205	7,435
Other industrial spirits non-potable, n.o.p.....		7,964	7,885	7,082
Drugs, medicinal.....		808,981		633,445
Dyeing and tanning materials.....		486		564
Explosives.....		235,132		239,827
Fertilizers—				
Ammonium sulphate..... cwt.	489,782	909,510	240,208	386,710
Cyanamid..... cwt.	3,858,586	6,436,519	3,084,484	5,005,809
Other mfd., n.o.p..... cwt.	85,782	106,695	114,148	213,881
Paints, pigments and varnishes.....		490,426		480,819
Soap, toilet..... lb.	5,253,717	720,743	4,930,607	623,886
Soap, n.o.p..... lb.	490,584	37,813	395,959	29,670
Inorganic Chemicals, n.o.p.—				
Arsenic, n.o.p..... cwt.	31,673	123,398	23,356	86,825
Acetate of lime..... cwt.	83,987	366,815	59,823	252,698
Calcium carbide.....		684,900		607,389
Soda and sodium compounds..... cwt.	943,504	4,256,621	709,366	3,139,883
Cobalt oxide and salts..... lb.	236,873	450,870	326,955	632,015
Other.....		101,457		109,652
Total inorganic chemicals, n.o.p.....		5,984,061		4,828,462
Creosote oil..... gal.	1,025,223	160,543	1,132,014	176,984
Glycerine, crude..... cwt.	13,064	68,101	5,118	26,633
Other drugs, dyes and chemicals.....		1,117,013		1,019,835
Total chemicals and allied products.....		21,988,239		16,497,490

Table 38.—Canada's Foreign Trade in Mineral Products, showing the Values by Countries, of Imports into Canada for Consumption and Exports of Canadian Merchandise, of the Principal Classes of Mineral Products, during the Calendar Year 1930.—Concluded.

Country	Iron and its products		Non-ferrous metals and their products		Non-metallic minerals and their products (except chemicals)		Chemicals and allied products	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
FOREIGN COUNTRIES—Con.	\$	\$	\$	\$	\$	\$	\$	\$
Japan.....	6,303	217,778	149,484	7,064,813	482,235	500,553	130,532	216,150
Korea.....		34	285	82				2,548
Latvia.....		8,605		554				
Liberia.....								
Lithuania.....				273				
Mexico.....	17	206,863	1,548	565,608	97,563	5,888		1,169,673
Morocco.....		99,106			7			
Netherlands.....	141,334	140,698	69,228	1,356,701	377,106	120,549	960,484	96,135
Dutch East Indies.....		695,940		22,925		3,703	1,032	17,883
Dutch Guiana.....		428		83				282
Dutch West Indies.....		29,509		163	1,847,264	452		2,069
Nicaragua.....		5,135		109				5,240
Norway.....	115,013	39,355	6,305	846,251	12,176	172,611	2,314	25
Panama.....		3,018		1,224		4,951		8,214
Paraguay.....		39,605		143			12,424	
Persia.....		70,765	98					
Peru.....	2,463	385,364		70,747	4,237,807	26,341	18,316	39,096
Poland and Danzig.....	4,747	4,288	664	1,789	1,800		18	
Portugal.....	79	140,847		76	3,393			
Azores and Madeira.....		8,087			4			80
Portuguese Africa.....		285,018		7,949		3,737		380,935
Portuguese Asia.....								156
Roumania.....		49,469		592				520
Russia.....	32	1,338,694	28,903	5,083	1,901,975			
Salvador.....		10,682		2,067				2,680
San Domingo.....		2,959		13,366		215		6,357
Siam.....		89,591		1,825		251		390
Spain.....	55	897,652	59,868	190,690	45,938	14,842	33,976	38,324
Canary Islands.....		20,125						9
Spanish Africa.....		22,510						
Sweden.....	1,238,480	168,781	322,121	113,985	54,071	47,652	73,950	119
Switzerland.....	155,833	65,212	1,428,011	8,827	3,380	2,187	343,926	53
Syria.....	40	51,119	358	15	6		605	150
Turkey.....		17,791					150	
United States.....	196,912,906	7,495,253	54,667,383	73,377,241	128,178,811	14,234,271	23,961,296	9,003,346
Alaska.....	2,886	1,197	1,628	100	106	418,777	2,892	19
American Virgin Islands.....		312					21	319
Guam.....								
Hawaii.....	3,421				10	20		
Philippine Islands.....	5	1,219		1,005		10,518		18,161
Porto Rico.....		3,261				9,041		28,820
Uruguay.....		360,664		18,121				256
Venezuela.....		267,006		45,249	2,765,972	13		94,369
Yugoslavia.....		30,451			37,460	9		
Total, Foreign Countries.....	203,735,118	22,750,187	59,052,256	91,735,863	150,668,301	18,120,476	32,001,825	11,551,767
Grand Total, Imports and Exports.....	225,068,051	47,565,525	66,926,975	115,766,626	164,848,720	22,862,181	36,785,050	16,320,506

UNITED STATES TARIFF RATES ON MINERAL PRODUCTS IMPORTED

Since Canadian producers of mineral products market a large part of their annual output in the United States it was thought it might be of value to readers of this report to have at hand a guide to *United States Tariff* and the following tables were therefore compiled. These have been checked by the *Customs Bureau* of the *United States Treasury Department* at Washington, D.C., U.S.A.

Table 39.—United States Tariff

U.S. Tariff Para- graph No.	Material	Duty
(a) On Metals and Manufactures of		
1608	Antimony ore.....	Free
1647	Chromite—Chromite or chrome ore.....	Free
1652	Cobalt metal and ore.....	Free
29	Cobalt linoleate.....	10c. per lb.
29	Cobalt, oxide of.....	20c. per lb.
29	Cobalt salts and compounds (all other).....	30% ad. val.
29	Cobalt sulphate.....	10c. per lb.
1658	Copper ore, regulus of, and black or coarse copper, and cement copper; old copper, fit only for re-manufacture, copper scale, clippings from new copper, and copper in plates, bars, ingots, or pigs not manufactured or specially provided for.....	Free
1659	Copper sulphate or blue vitriol, copper acetate and subacetate.....	Free
381	Copper in rolls, rods or sheets.....	2½c. per lb.
	Engraver's plates, not ground and seamless copper tubes and tubing.....	7c. per lb.
	Engraver's plates, ground, and bronzed copper tubes.....	11c. per lb.
	Brass rods, sheet brass, brass plates, bars and strips, muntz or yellow metal sheets, sheathing, bolts, piston rods and shafting.....	4c. per lb.
	Seamless brass tubes and tubing.....	8c. per lb.
	Bronzed brass tubes, brass angles and channels.....	12c. per lb.
	Bronze rods and sheets.....	4c. per lb.
	Bronze tubes.....	8c. per lb.
1638	Bullion gold or silver.....	Free
1734	Gold ores and sweepings.....	Free
1700	Iron ore including manganiferous iron ore containing not more than 10% of metallic manganese and residuum from burnt pyrites.....	Free
1777	Sulphur in any form, and sulphur ore and spent oxide of iron, containing more than 25% of sulphur.....	Free
391	Lead bearing ores, glue dust and mattes—duty applied on lead contents, such duty shall not be applied to the lead contained in copper mattes unless actually recovered.....	1½c. per lb.
392	Lead bullion or base bullion, lead in pigs and bars, dross, reclaimed lead, scrap lead, antimonial lead, antimonial scrap lead, type metal, babbitt, solder and all other combinations not specially provided for, duty to apply on lead contents.....	2½c. per lb.
46	Lead in sheets, pipe, shot, glazier's lead and lead wire.....	2½c. per lb.
72	Lead, linoleate of.....	30% ad. val.
302	Lead litharge.....	2½c. per lb.
	Manganese ore or concentrates and manganiferous iron ore containing in excess of 10% of metallic manganese.....	1c. per lb. on metallic manganese content.
302	Molybdenum ore or concentrates.....	35c. per lb. on metallic molybdenum content.
302	Tungsten ore or concentrates.....	50c. per lb. on metallic tungsten content.
1734	Nickel mattes and ores of nickel.....	Free
1734	Nickel oxide.....	Free
389	Nickel and nickel alloys in pigs, ingots, shot, cubes and similar forms.....	3c. per lb.
389	Nickel in bars, rods, sheets, strips, tubing, etc.....	25% ad. val.
389	In addition thereto on the foregoing if cold rolled, drawn or worked.....	10% ad. val.
1699)	Platinum, palladium and other metals of the platinum group.....	Free
1744)		
393	Zinc bearing ore of all kinds except pyrites containing no more than 3% zinc, such duties shall not be applied to zinc in lead or copper ores unless actually recovered.....	1½c. per lb. on metallic zinc content.
394	Zinc in blocks, pigs or slabs and zinc dust.....	1½c. per lb.
394	Zinc in sheets.....	2c. per lb.
394	Zinc scrap for re-manufacturing.....	1½c. per lb.
(b) On Non-Metallic Minerals		
1719	Actinolite—crude, classified as "minerals, crude, not specially provided for".....	Free
214	Actinolite—ground, classified as "earthy or mineral substances, wholly or partly manufactured, not specially provided for".....	30% ad. val.
1614	Arsenic—white or arsenious acid.....	Free
1613	Arsenic—sulphide of.....	Free
379	Arsenic—metallic.....	6c. per lb.
1616	Asbestos—crude, fibres, sand.....	Free
1501	Asbestos—yarn.....	40% ad val.
67	Barytes—ore, crude.....	\$4 per ton
67	Barytes—ore, ground.....	\$7.50 per ton
	Calcite—not mentioned by this name in the tariff. Chalk, crude, is free (item 1645) and chalk, ground, is dutiable at ¼ of 1c. per lb. (item 20).	

Table 39.—United States Tariff—Continued

U.S. Tariff Para- graph No.	Material	Duty
(b) On Non-Metallic Minerals—Concluded		
1672	Corundum—ore.....	Free
1514	Corundum—ground.....	1c. per lb.
207	Feldspar—crude. Proc. 12-2-31.....	50c. per ton
214	Feldspar—ground, dutiable as "earthy or mineral substances, wholly or partly manu- factured, not specially provided for".....	30% ad val.
207	Fluorspar, containing more than 97% calcium fluoride.....	\$5.60 per ton
	Fluorspar, containing not more than 97 calcium fluoride.....	\$8.40 per ton
213	Graphite or plumbago—crude or refined—amorphous.....	10% ad. val.
213	Graphite or plumbago—crude or refined—crystalline lump, chip or dust.....	30% ad val.
213	Graphite or plumbago—crude or refined—crystalline flake.....	1-65c. per lb.
1692	Grindstones.....	Free
207	Fullers earth, unwrought and unmanufactured.....	\$1.50 per ton
	Fullers earth, wrought or manufactured.....	\$3.25 per ton
1743	Gypsum—crude.....	Free
205	Gypsum—ground.....	\$1.40 per ton
73	Iron oxides—ochres, crude.....	1c. per lb.
73	Iron oxides—ochres, washed or ground.....	1c. per lb.
73	Iron oxides—"iron oxide pigments not specifically provided for".....	20% ad. val.
204	Magnesite—crude.....	15½c. per lb.
204	Magnesite—caustic calcined.....	15½c. per lb.
204	Magnesite—dead burned and grain.....	23½c. per lb.
50	Magnesium sulphate (Epsom salts).....	1c. per lb.
208	Mica—unmanufactured, valued at not above 15 cents per pound.....	4c. per lb.
208	Mica—unmanufactured, valued above 15 cents per pound.....	25% ad. val. plus 4c.
208	Mica—cut or trimmed, and mica splittings.....	per lb.
208	Mica—ground.....	20% ad. val.
208 (b)	Mica, cut or stamped to dimensions, shape, or form.....	40% ad. val.
208 (c)	Mica films and splittings not cut or stamped to dimensions not above twelve ten-thousandths of one inch in thickness.....	25% ad. val.
	Over twelve ten-thousandths of one inch in thickness.....	40% ad. val.
208 (d)	Mica films and splittings cut or stamped to dimensions.....	45% ad. val.
208 (e)	Untrimmed phlogopite mica from which no rectangular piece exceeding two inches in length or one inch in width may be cut.....	15% ad. val.
809	Mineral waters.....	10c. per gal.
1740	Phosphate—"Phosphates, crude".....	Free
1777	Pyrites—"Sulphur ore, such as pyrites or sulphide of iron in its natural state, and spent oxide of iron, containing more than 25% of sulphur".....	Free
81	Salt—in bags, sacks, barrels, or other packages.....	11c. per 100 lb.
81	Salt—in bulk.....	7c. per 100 lb.
81	Sodium sulphate—crystallized or Glauber's salt.....	\$1.00 per ton.
1766	Sodium sulphate, crude or crude salt cake.....	Free
207	Silica crude, sand containing 95% or more of silica and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass.....	\$2.00 per ton
1775	Silica—not specially provided for.....	Free
209	Talc—crude.....	1c. per lb.
209	Talc—ground, washed, powdered or pulverized (except toilet preparations).....	35% ad. val.
1775	Tripoli—crude or manufactured, not specially provided for.....	Free
(c) On Structural Materials and Clay Products		
Clay Products—		
201	Brick—bath, chrome and fire, n.s.p.f.....	25% ad. val.
201	Magnesite brick.....	1c. per lb. and 10%
201	All other brick, not specially provided for; not glazed, enamelled, painted, vitrified, ornamented, or decorated in any manner.....	ad. val.
201	Brick if glazed, enamelled, painted, vitrified, ornamented or decorated in any manner.....	\$1.25 per M
		5% ad. val. but not less than \$1.50 per M
207	Bentonite, unwrought and unmanufactured.....	\$1.50 per ton
207	Bentonite, wrought or manufactured.....	\$3.25 per ton
207	China clay or kaolin.....	\$2.50 per ton
207	Clays or earths, unwrought or unmanufactured, including common blue clay and Gross- Almerode glass pot clay, n.s.p.f.....	\$1.00 per ton
207	Clays or earths, wrought or manufactured, n.s.p.f.....	\$2.00 per ton
210	Earthenware—common yellow, brown or gray, made wholly of natural, unwashed, un- mixed and uncoloured clay; common salt-glazed stoneware; stoneware and earthen- ware crucibles; all the foregoing not ornamented, incised, or decorated in any manner.....	15% ad. val.
210	Earthenware—common yellow, brown or gray earthenware made entirely of natural, unwashed, unixed and uncoloured clay; common salt-glazed stoneware; stone- ware and earthenware crucibles; all the foregoing ornamented, incised, or decorat- ed in any manner and manufacturers wholly or in chief value of such ware, n.s.p.f.....	20% ad val.
210	Earthenware—Rockingham.....	25% ad. val.
203	Lime—n.s.p.f., including weight of container.....	10c. per 100 lb.
203	Lime—hydrated, including weight of container.....	12c. per 100 lb.
235	Slates—slate chimney pieces, mantles, slates for tables, roofing slates, and all other manufactures of slate, n.s.p.f.....	25% ad. val.
Stone—		
203	Limestone (not suitable for use as monumental or building stone) crude, or crushed but not pulverized.....	5c. per 100 lb.
234	Limestone, greenstone, sandstone, lava and all other stone suitable for use as monu- mental or building stone, except marble, breccia, and onyx, n.s.p.f., hewn, dressed, or polished or otherwise manufactured.....	50% ad. val.

Table 39.—United States Tariff—Concluded

U.S. Tariff Para- graph No.	Material	Duty
(c) On Structural Materials and Clay Products—Concluded		
<i>Stone—Concluded</i>		
234	Limestone, freestone, sandstone, lava and other, n.s.p.f., unmanufactured or not dressed hewn or polished.....	15c. per cubic ft.
234	Granite suitable for use as monumental, paving or building stone, not specially provided for, hewn, dressed, painted, pitched, lined or polished of otherwise manufactured.....	60% ad. val.
234	Granite—unmanufactured or not dressed.....	25c. cubic ft.
234	Travertine stone unmanufactured, not dressed, hewn or polished.....	25c. per cu. ft.
232	Marble, breccia and onyx, in block, rough or squared only.....	65c. per cubic ft.
232	Marble, breccia and onyx, sawed or dressed over two inches in thickness.....	\$1.00 per cubic ft.
232	Marble, breccia and onyx slabs and paving tiles, containing not less than four superficial inches, if not more than one inch in thickness.....	8c. per superficial foot.
	If more than one inch and not more than one and one-half inches in thickness.....	10c. per superficial ft.
	If more than one and one-half inches and not more than two inches in thickness.....	13c. for superficial ft.
	In addition thereto on all the foregoing if rubbed in whole or in part.....	3c. per superficial foot.
	If polished in whole or part (whether or not rubbed).....	6c. per superficial ft.
232	Mosaic cubes of marble, breccia or onyx not exceeding two cubic inches in size, if loose..	One fourth of one cent per lb. and 20% ad. val.
	If attached to paper or other material.....	5c. per superficial ft. and 35% ad val.
1775	Stone and sand: burrstone in blocks, rough or unmanufactured; quartzite; trap rock; rottenstone, tripoli and sand, crude or manufactured; cliffstone; freestone, granite and sandstone unmanufactured and not suitable for use as monumental, paving or building stone; all of the foregoing n.s.p.f.....	Free.

Table 40.—Accidents in the Mining Industry in Canada, by Provinces*, 1930

Cause of Accident	Nova Scotia		New Brunswick		Quebec		Ontario		Saskatchewan		Alberta		British Columbia		Canada	
	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal
UNDERGROUND—																
Falls of roof or face.....	9	639	2	48	8	75	16	143	...	8	5	53	11	242	51	1,208
Mine cars and locomotives.....	3	479	...	41	...	32	2	87	...	15	2	45	4	151	11	850
Gas and dust explosions.....	8	8	...	...	...	...	...	...	...	...	...	3	145	...	53	11
Explosives.....	3	...	...	6	3	6	3	13	...	1	...	2	2	6	8	37
Electricity.....	...	1	...	...	...	1	...	...	...	5	...	1	...	2	...	10
Miscellaneous.....	2	857	...	80	4	324	11	1140	2	59	1	42	11	514	31	3,016
Total.....	22	1987	2	175	15	438	32	1383	2	88	8	146	73	915	154	5,132
SURFACE—																
Haulage and cars.....	...	46	...	9	2	10	4	30	...	10	...	7	...	40	6	152
Machinery.....	1	25	...	3	4	37	1	64	...	5	2	2	...	68	8	204
Miscellaneous.....	...	156	...	7	2	109	19	690	...	24	1	11	...	313	22	1,310
Total.....	1	227	...	19	8	156	24	784	...	39	3	20	...	421	36	1,666
Grand Total.....	23	2214	2	194	23	594	56	2167	2	127	11	166	73	1336	190	6,798

*Data for Manitoba not available.

†These 45 deaths were due to an explosion which very probably had its origin in and was due to a mine fire.

CHAPTER TWO

THE GOLD MINING INDUSTRY IN CANADA

(With tables showing the production of gold)

1. General Review.
2. Review of the Gold Mining Industry in Canada by Areas.
3. The Alluvial Gold Mining Industry.
4. The Auriferous Quartz Mining Industry.
5. The Copper-Gold-Silver Mining Industry.
6. Commodity Statistics—including tables showing production by provinces, imports, exports, and world output of gold.

1. General Review

CANADA

(a) *Definition of the Industry.*—Canada's gold mining industry is classified into three main divisions; the direct recovery of placer gold or the alluvial gold mining industry; the extraction of the metal from gold-bearing quartz ores, designated as the auriferous quartz mining industry; and the supply coming, as a by-product, from the metallurgical treatment of base metal ores and, in this classification, called the copper-gold-silver mining industry. Gold obtained in the copper-nickel, silver-lead, and other mining or associated industries is included in the total annual production of the country.

(b) *Historical.*—The early history (1850-1895) of gold production in Canada is largely confined to the placer operations of the pioneer prospector in British Columbia and it was from this source that most of the metal was derived until the discovery, in 1896, of the extremely rich gravels of the Klondike river in the Yukon Territory; between 1898 and 1905 gold to the value of more than \$100,000,000 (4,838,000 fine ounces) is stated to have been obtained from the placers of the Bonanza, Eldorado, Hunker, Dominion and Sulphur Creeks. Almost coincident with this western activity was witnessed the Lake of the Woods discoveries in Ontario and renewed activity on the Nova Scotia quartz veins. The past fifteen to twenty years, although witnessing the decline of the alluvial gold industry, have given to the nation the highly productive auriferous quartz mines of the Porcupine, Kirkland Lake camps in Ontario and Portland Canal camp in British Columbia. The base metal mining industries are now contributing important and increasing quantities of gold to Canada's total production. This has been most highly reflected in the growing gold production originating in the recent expansion in copper-nickel and copper-gold mining industries; the increase from the latter industry is strikingly exemplified in the recovery of this metal as the result of extensive mining and metallurgical developments at the Noranda copper mine in the province of Quebec.

(c) *Sources.*—In 1930 the auriferous quartz mines contributed 1,782,875 fine ounces, or 84.82 per cent of the total Dominion production; alluvial deposits 42,324 fine ounces, or 2.01 per cent; fine gold in blister copper and base bullion made at Canadian smelters from domestic ores, 172,642 fine ounces, or 8.21 per cent; and the estimated recovery of 104,227 fine ounces of gold in ores, matte, slags and concentrates exported to foreign smelters comprised the balance.

(d) *Importance of the Industry.*—Gold held second place in point of value among Canada's mineral products in 1930, being surpassed only by coal. The value of gold represented 15.5 per cent of the total mineral production of the Dominion in 1930. As a world producer of gold, Canada now ranks second; the Union of South Africa was first with a production from the Witwatersand, Heidelberg, and other districts of 10,716,351 fine ounces, and the United States (exclusive of the Philippine Islands) was third with an output of 2,100,395 fine ounces. Southern

Rhodesia produced 547,630 fine ounces during 1930 and the Australian output amounted to 467,001 fine ounces. Official gold figures from Russia according to Non-Ferrous Metals Trust as reported by the Engineering and Mining World were 868,068 fine ounces. The discovery and development of our more important Canadian gold deposits have not only contributed directly to the wealth of the nation but have assisted materially in the colonization of virgin lands, the harnessing of important water powers, and the general development of our northern natural resources.

2. Review of the Gold Mining Industry by Areas

NOVA SCOTIA

Gold contained in crude bullion produced in Nova Scotia in 1930 totalled 1,272 fine ounces. Mining of this metal in the province dates back to the early sixties. Annual yields varying from 6,863 fine ounces to 30,348 fine ounces are recorded from 1862 to 1902. In 1904 production fell to 10,362 ounces and remained close to this quantity until 1910, since then there has been no appreciable increase in production. The total value of the Nova Scotia gold output, including that for 1930, amounts to \$19,105,157.

In the Nova Scotia deposits gold occurs usually in the free state and sometimes as rich concentrations of native metal in comparatively narrow quartz veins or multiple vein systems called belts. Values in some ore bodies are associated with arsenopyrite and antimony; at present there are about one hundred known localities where gold has been found in situ. The veins occur, in most instances, in anticlinal folds of slate or quartzite. Beaver Dam, Fifteen Mile Stream, West Gore and other auriferous areas have witnessed some renewed activity during the past few years. Hydro-electric power is now available throughout a large part of the province.

QUEBEC

Quebec with a production of 141,747 fine ounces of gold in 1930 has advanced in importance among the gold producing provinces from a position of sixth in 1924 to third in 1930. This increase, especially since 1928, has been largely due to the recovery of gold from blister copper produced at the Noranda smelter; this gold production coming from the sulphite ores of the Horne mine is now an important item in Canada's precious metal output. The Siscoe was in steady production throughout the year, milling over ninety tons of ore per day, with a resulting recovery of \$11.11 in gold per ton. The mill capacity was stepped-up to 150 tons per day at the end of the year.

The new mill at the Granada was operated for the first time early in July and in the following months the mine produced ore at the rate of about sixty tons per day, the ore averaging over \$14.00 in gold per ton. Several shipments of high grade gold ore were made from the O'Brien mine in Cadillac township. The construction of a twenty-five ton mill was commenced at the Venus mine in the township of Barraute. A number of interesting gold discoveries were made in the townships of Duparquet, Pascalis, Louvicourt and Rouyn; some trenching and diamond drilling was completed on these properties during the winter months. A large number of claims were staked in the vicinity of new "finds".

ONTARIO

A remarkable increase in the production of gold from Ontario mines has occurred during the past twenty years. Almost continuous systematic exploration and development during recent years, of important auriferous quartz vein systems, together with improvements in both mining and milling practices evidence their repercussion in the present high record gold production of the province.

Ontario mines, during 1930, produced 1,736,012 fine ounces of gold, or 82.6 per cent of the Canadian gold production. This output in comparison with the 1913 record of 219,801 ounces emphasizes the remarkable growth of the Ontario gold mining industry in less than two decades.

The Porcupine camp, with eight major operating mines, produced 859,084 fine ounces in 1930. The Hollinger mine, as in 1929, remained the largest producer of gold in Canada; McIntyre was second in importance among the Porcupine producers, the flotation section of this company's

new mill commenced operating in 1930. It is expected that the entire plant, when completed will have a capacity of 2,000 tons daily. Dome Mines began treatment of ores in their new 1,500 ton mill during November. Full capacity of this plant had not yet been attained at the close of the year. Other mines producing in this camp during 1930 were the Coniaurum, Vipond, Porcupine United, West Dome Lake and March. The value of gold production from this area formed 50.2 per cent of the total for the province.

The quartz veins of the Porcupine camp are usually associated with quartz porphyries, Keewatin schistose volcanics, and conglomerate or other sediments of Temiskaming age. Ore bodies vary in size and contour; the most characteristic type is the lenticular quartz vein occurring in pyritiferous chist, visible free gold is fairly common in the quartz.

Kirkland Lake mines produced 830,733 fine ounces of gold in 1930 and since 1913 the total value of gold output from this camp is \$79,548,286. The value of the 1930 production at \$17,172,775 represents 47.9 per cent of the provincial gold total. Producing mines, in the Kirkland Lake camp, in 1930 in the order of their production were the Lake Shore, Teck-Hughes, Wright-Hargreaves, Sylvanite, Kirkland Lake and Barry Hollinger. Most of the mines in this area carried on systematic development and exploration programs throughout the year. At the Lake Shore new crushers and electric locomotives were installed underground while on the surface new construction was advanced or completed on the mill, crusher house, refinery, shaft house, power house and other structures. These improvements amounted in all to nearly two million dollars. At the Teck-Hughes the estimate of "positive ore" is regarded as sufficient to satisfy the mill requirements for a period of over two years. During the year the cost of producing an ounce of gold, at this mine, was reduced eighty-seven cents, the metal is now being recovered for \$8.34 per ounce with a cost of \$6.41 per ton of ore treated.

Values in the Kirkland Lake camp are believed to be genetically related to a feldspar porphyry intrusive. The gold deposition or values appear to be localized in a main fracture or shear zone intersecting Temiskaming sediments, feldspar porphyry and other rocks. The principal fissures and shatter zone vein fillings are chiefly composed of quartz; gold values are often high across several feet of vein matter, free gold and tellurides are quite common.

In the Patricia district the Howey mine continued development of the ore reserves and commenced operation of their new mill on April 2, 1930. Prospecting and development work were advanced on properties in Red, Woman, and Summit Lake areas.

In October a promising discovery of gold, known as the Ashley find, was made in Bannockburn township, Matachewan district. Diamond drilling of this vein was carried on by the Mining Corporation of Canada. The discovery was followed by extensive staking of claims in the townships of Bannockburn, Argyle, Hincks and Montrose.

A small gold mill was installed on the Cooper gold mine in Michipicoten area and a contract let by the Parkhill Gold Mining Company for construction of a 75 ton mill in the same district. West of Port Arthur, the Moss Gold Mines, Ltd., continued the development of the property formerly known as the Huronian.

The metallurgical plants of the International Nickel Company produce a considerable amount of gold in the treatment of the copper-nickel ores mined in the Sudbury district. In mid-year the new electrolytic refinery of the Ontario Refining Company at Copper Cliff was successfully placed in operation. Gold and silver contained in Frood and Garson ores are recovered at this refinery.

Gold occurrences are rather widespread in Ontario. Auriferous quartz veins have been discovered and worked in areas as far apart as Frontenac County in eastern Ontario and sections contiguous to the Manitoba boundary. Some of these older mines, often closed or abandoned for many years, have been recently dewatered, re-examined and, in a few instances, placed under development. It has been suggested that modern mining equipment, improved metallurgical processes and the comparatively low hydro-electric power costs of to day might permit of the profitable operation of some of these idle or abandoned properties.

PRAIRIE PROVINCES

Manitoba, Saskatchewan and Alberta.—The greater portion of the southern sections of these three provinces is underlain by a series of post Cambrian sediments, a series of rocks unlikely to contain gold bearing deposits.

Large areas of pre-Cambrian rocks exist in the northern parts of Manitoba and Saskatchewan. In Alberta the expanse of these older formations is much less; consisting of about 5,000 square miles. It was only during recent years that anything approaching a widespread exploration of these virgin areas has been attempted. Transportation facilities were, until lately, quite limited and the movement of supplies was more or less restricted to the main waterways. The topography and geology are generally similar to those of the eastern Archaean peneplain with possibly a greater proportion of muskeg or bog land. Aerial transportation and photography have, in the last few years, been of great benefit to the explorer and prospector in the northern sections of the Prairie provinces. Prospectors with supplies and light mining equipment are now able to reach the most remote sections with comparative ease.

Gold has been found over widely scattered sections in Manitoba and in a few localities in Saskatchewan. In the eastern or Rice-Long lakes area of Manitoba several promising gold properties have been systematically explored with encouraging results. The Central Manitoba mine in this district is now in its fourth year of production; development work was advanced at the San Antonio and it is reported that this company will commence the construction of a 150-ton mill in 1931. Prospecting in Manitoba was considerably curtailed as compared to 1929; in the northwestern part of the province the more important field operations, of an exploratory nature, occurred in the vicinity of Herb lake and areas close to the Saskatchewan line. Copper-zinc-gold ores were developed and mined at the Flin Flon and Sherritt-Gordon mines.

There is no record of any important gold production from Alberta. Efforts to profitably recover comparatively small quantities of gold contained in the sand and gravels of the Saskatchewan river have been attempted and it is reported that a gold dredge will be constructed and placed in operation on the McLeod river sometime during 1931.

BRITISH COLUMBIA

In 1930 British Columbia produced 164,331 ounces of fine gold valued at \$3,397,023 as compared with 154,204 ounces and \$3,187,680 in 1929; of the 1930 production, alluvial gold contributed 7,164 ounces valued at \$148,093. The placer gold output of the Atlin division for 1930 was 3,141 ounces valued at \$53,397 as compared with \$40,936 for 1929; this shows a steady maintenance in output. With the exception of the Compagnie Francaise des Mines d'or du Canada, which came into partial production this year, the larger operators were still engaged in preparatory work. The Pioneer mine in the Lillooet division is now entering the better part of its career; depth development and mill construction during the last two years have established this property as one of the important gold mines of the province. Owing to the erratic nature of the mineralization at the Big Missouri, where the values are chiefly in gold, the Consolidated Mining and Smelting Company commenced the erection of a 100 ton pilot mill which was completed in December and began operations in order to determine accurate and average values in different sections of the ore body. At the Reno mine in the Nelson division a 30 ton gold cyanide plant was constructed in 1929 and brought into steady production in 1930. The Hedley Gold Mining Company operated the Nickel Plate mine from April to November producing about 39,670 tons of arsenical ore. A diamond drilling campaign was continued and some mineable though small bodies of ore located, it is doubtful whether this property will continue operations in 1931. During 1930 operations at the Premier were continuous; this mine is the largest producer of gold and the second largest producer of silver in the province. It has, since 1918, yielded 1,097,621 ounces of gold and 26,969,570 ounces of silver and distributed over \$15,000,000 in dividends.

During the year prospecting, scouting and exploration for mineral properties proceeded steadily and an intensified search for gold properties was apparent. A discovery of auriferous arsenopyrite occurring in association with pyrrhotite was made late in the year by P. Johnston and F. Lawrence at a distance of about nine miles due west of Mount Olie on the C.N.R. Two

samples, taken respectively on the east and west side of a cut through a six foot width of sulphide, assayed 2.5 ounces of gold to the ton. The property has been acquired by the Premier Gold Mining Company.

The economic geology of British Columbia gold deposits is, on the whole, considerably different from that found in the eastern camps. Intrusives and sediments of much later geological periods are often encountered and the rugged topography is in strong contrast to the weathered and glaciated pre-Cambrian surfaces of Manitoba, Ontario and Quebec.

YUKON

In the Yukon two companies conducted dredging operations in 1930. The Yukon Consolidated Gold Corporation, Ltd., operated electrically equipped dredges on Bear, Upper and Lower Dominion creeks and the other dredging company, employing about sixteen men, conducted operations in the glacier district. Many individuals and miners working in partnership were engaged in placer mining and experienced a successful season. The total alluvial gold production, together with a small quantity of the metal contained in silver-lead concentrates, amounted to 35,517 fine ounces in 1930. This output is in sad contrast to those of the old "boom" years in the Klondike when, during 1900, 1,077,553 fine ounces were recovered. Following the sensationally rich discoveries of '96 and '97 the production mounted rapidly for a few years. Then came a period of lessened individual recoveries, depleted values and the entry of large scale operator. Modern dredges and systematic hydraulicking largely accounted for an increased production from 1909 to 1913. During the last decade the annual placer gold production in the Yukon has been much less than in former years.

(3) The Alluvial Gold Mining Industry.

It is very difficult to secure complete information on alluvial mining in Canada since placer fields are mostly remote and except in a few instances are operated by individuals of usually no fixed abode. Dredging and hydraulicking companies operating in the Yukon Territory send annual returns to the Bureau and with the aid of the Mining Lands Branch, Department of Interior, under whose regulations mining is carried on in this territory, more definite information is obtainable.

In the Cariboo district of British Columbia the placer production for the year was \$42,483 as compared with \$42,415 in 1929. The chief contributor to the output was the Lowhee Mining Company on Lowhee creek; other important producers were the various Chinese operating at the Point. A new discovery was reported on Canyon creek and investigated by means of Key-stone drilling. The French Creek Development Company, Ltd., has been conducting hydraulicking operations on French Creek, Revelstoke Mining division, since 1927, towards the end of the 1930 season pay-gravel was encountered and some \$2,700 in coarse gold recovered.

Increased interest in placer mining by individuals and companies was evident during 1930 in the Stikine, Liard and Atlin divisions. Several large operations are approaching the production stage and an increased gold output is expected soon.

Placer gold was recovered as early as 1823 from the gravels of the Chaudière river in Quebec. There is no production from this source at the present time although considerable churn drill and underground exploration of Gilbert river gravels in this district was conducted in 1930.

The report of the Gold Commissioner, Dawson, Yukon Territory, on mining for the year ending March 31, 1931 is as follows:—

COPY OF ANNUAL REPORT OF THE GOLD COMMISSIONER OF THE YUKON TERRITORY FOR THE FISCAL YEAR ENDING MARCH 31, 1931

MAY 13, 1931.

SIR:—I have the honour to submit herewith my report on mining activities in the Yukon Territory, for the fiscal year ending March 31st, 1931.

The revenue on account of mining from the Dawson office was \$40,449.55. This included an amount of \$470.95 which was collected by the Mining Recorder at Mayo during April, 1930, after which date that office reported direct to Ottawa. This will account for the decreased

revenue from this office. The revenue reported from the Dawson office does not include the various items paid direct to the Department at Ottawa, nor the revenue collected in the Whitehorse office, and the Mayo office for the eleven months which were reported direct. Statements are attached showing how the revenue is made up.

PLACER GOLD MINING

The amount of placer gold mined during the year on which royalty export tax was paid was 43,659.72, on which the royalty paid amounted to \$16,372.41.

YUKON CONSOLIDATED GOLD CORPORATION, LIMITED

Hydro-Electric Power Plant.—This plant operated continuously throughout the year. A total of 11,696,500 K.W.H. were generated.

Power was furnished to four dredges, three thawing plants, the machine and other repair shops, to all the camps for lighting purposes, to The Dawson Electric Light and Power Company, Limited, for lighting the City of Dawson and to The Dawson City Water and Power Company, Limited, for pumping, and during the winter months heating, by means of an electric steam generator, the water circulated through the mains of Dawson.

Considerable gravel was hauled and dumped along the lower bank of the ditch which conveys the water from the North Fork of the Klondyke River to the generators.

The transmission lines, one hundred and thirty miles in length, which transmit the power from the plant to the various activities, were kept in efficient repair.

Dredging and Thawing.—Dredge Canadian No. 3 operated on Hydraulic Lease No. 18, about five miles below Bear Creek. It dug 1,248,200 cubic yards.

From 1st April until 31st October three Keystone Drills were at work drilling pits for the thawing points ahead of Dredge Canadian No. 3. Two Gwynnes Centrifugal Pumps, driven by one hundred and fifty horse power motors, and each delivering six thousand gallons of water per minute, furnished the water for these points. Approximately two and one-half million cubic yards were thawed.

Dredge Canadian No. 4 also operated on Hydraulic Lease No. 18, about one-half mile above Bear Creek Camp in ground naturally thawed.

Dredge New North West No. 1 operated on Upper Dominion Creek, immediately below the mouth of Caribou Creek. It dug 417,719 cubic yards.

A thawing plant of 1,600 points treated the ground ahead of this dredge. Two centrifugal pumps, driven by seventy-five horse-power motors and each delivering three thousand gallons per minute supplied the water for this battery of points.

Dredge New North West No. 2 operated on Lower Dominion in the section known as Granville Flat. It dug 467,073 cubic yards. A plant of one thousand points thawed the ground for this dredge. The water was supplied through the ditches constructed under Water Grants Nos. 9024 and 9025.

Hydraulic Operations.—Hydraulic ing at Crofton and Lovett was carried on with water supplied through the Twelve Mile Ditch.

Water Grants.—Water Power Grant No. 10, by virtue of which 20,000 inches of water is diverted from the North Fork of the Klondyke River and delivered to the Power Plant, expired on 24th December, 1930. Notices of renewal were posted and application made in accordance with the regulations governing such renewals.

Water Grant No. 9129 which confers the right to divert 3,000 inches of water from the Klondyke River, opposite the mouth of Rock Creek, expired on July 2nd, 1930. A renewal for a period of ten years was issued by the Department.

Mining Claims and Hydraulic Leases.—A total of 1,216 mining claims and seven hydraulic leases were renewed during the year.

Salaries and Wages.—An average of two hundred and twenty-five men were employed from April 1st until November 30th.

Transportation.—Four caterpillar tractors and five teams of horses were kept busy hauling supplies to the different units.

Repair Shops.—A fully equipped machine shop where machining in all its branches, forging, blacksmithing, electric and oxy-acetylene cutting and welding are carried on, was operated at Bear Creek. In connection with the machine shop there is a gas house where oxygen and acetylene gas are generated. The repairs to the caterpillar tractors, trucks and cars used in connection with the operations are cared for in their respective repair shops.

OTHER PLACER OPERATIONS

Many individuals and miners working in partnership were engaged in placer mining and experienced a successful season. The following Prospecting Leases were issued during the year:—

- One Mile on Rogers Creek, Carmacks Division, issued to George Fairclough;
- One Mile on Guder Creek, Carmacks Division, issued to George McDade;
- Five Miles on Kitchener Creek, Carmacks Division, issued to Ave Van Bibber;
- Four Miles on Seymour Creek, Carmacks Division, issued to Jos. A. Walsh;
- Two Miles on Seymour Creek, Carmacks Division, issued to Fred. Guder;
- One Mile, on Portland Creek, tributary to Dominion Creek, issued to Jos. W. Stingle;
- One Mile on Bench Ground right limit Dominion and Gold Run Creeks, issued to Jos. Croteau;
- 5,000 feet on Thistle Creek, tributary Yukon River, issued to Alex. Veale;
- One Mile on Thistle Creek, tributary to Yukon River, issued to F. G. Manley;
- 5,000 feet on Upper Bonanza Creek, issued to G. R. Clarke;
- One Mile on Upper Bonanza Creek, issued to Mary B. Clarke;
- 5,240 feet on Gem Creek, tributary of McQuesten River, issued to J. Drapeau and George Potter;
- One Mile on Johnson Creek, tributary of McQuesten River, issued to Jas. A. Anderson;
- One Mile on Discovery Pup, tributary Nansen Creek, issued to E. K. Mack;
- One Mile on Lake Creek, tributary of Big Salmon River, issued to T. H. Kerruish.

The Dredge which resumed operations during the season 1929, in the Glacier district, worked again last summer and experienced a successful season. They employed about sixteen men, and the Manager of the Company left Dawson early in the season with a number of men to make preparation for this season's work.

LODE MINING, DAWSON DISTRICT

Development work has been continued on the "Lone Star" Group of Claims on Victoria Gulch. Last summer they continued the new tunnel another fifty-three feet. It was then in 258 feet. Work was then stopped, as the tunnel had then crossed the mineralized zone. A parting was put in and a cross-cut tunnel towards the shaft in the main open cut was then started and driven 213 feet from the parting. At that point it crossed the old tunnel near its termination. The cross-cut tunnel was continued until 252 feet from the parting. Work on this was then stopped and the old tunnel back to the old upraise leading into the main open-cut was re-opened, the floor cut up and cleaned for 110 feet, and the old upraise partly cleared. The cross-cut tunnel has to be continued another 140 feet to get beneath the shaft in the main open-cut and then an upraise about 60 feet into the bottom of the shaft to make the connection.

Seven grab samples taken at different places in the new tunnel crossing the South by Southeast end of the mineralized zone near the head of 14-Pup, a tributary of Victoria Gulch, averaged \$1.80 per ton. Four grab samples at various intervals along the mineralized zone in the cross-cut tunnel from the start at the parting to the face, 105 feet distant, towards the main open-cut, averaged \$13.39 per ton. Concentrate from one-half pan of fine ore in cross-cut tunnel at the

face, 105 feet from the parting assayed \$260.00 per ton. A car sample was taken from each round of shots along the cross-cut tunnel. The first one was taken at a point 147 feet from the parting and the last one at the face, 252 feet from the parting. The average of the 24 car samples taken was \$3.71 per ton, the best values coming after crossing the old tunnel near the face, 252 feet from the parting.

In the cross-cut tunnel, 150 feet from the parting to 145 feet from the parting, four rich stringers of quartz were passed through, the stringers apparently crossing into the right wall of the cross-cut tunnel and thence into the mineralized zone. The stringers contained free gold and auriferous sulphides of iron and lead (galena). The average value of four small samples of these stringers came to \$79.78 per ton. The highest, containing galena, was \$153.64, and the lowest, containing yellow iron pyrite, was \$12.61 per ton.

Ten sacks were filled from the dump, five from each side of the dump, by shovel. The ten sacks were sent to the Consolidated Mining and Smelting Company of Canada, Limited, at Trail, B.C., for a laboratory test as to treatment. It assayed \$1.24 per ton. The company reported, in part, that the ores presented no difficulty in milling and a recovery of 96 per cent to 98 per cent should be maintained in practice by flotation, followed by tabling flotation-tailing and cyaniding the combined concentrate.

A stoper machine and another DL machine drill, with spare parts for both, were purchased from the Sullivan Machinery Company.

A new discovery of gold bearing rock is reported from Big Creek, about forty-six miles north of Carmacks. The vein is said to be about four to eight feet wide, and the out-cropping has been traced for four thousand feet on the surface. Samples of the rock assayed did not run very high in gold values, but the samples were taken from surface showings, and not enough work has yet been done on the vein to determine the extent and value of the find. There have been one hundred and two (102) quartz and sixteen (16) placer claims recorded in that District. There have also been five (5) Prospecting Leases granted for the total of thirteen miles.

LODE MINING—MAYO DISTRICT

The Treadwell Yukon Company, Limited, at the end of the year had under option, purchased, or located in its own name fifty-three (53) lode claims of a total area of 1,372.93 acres, and seven (7) placer claims which are divided in six separate groups for mining and prospecting purposes. During the year the company optioned the Martin Malesich Group of six lode claims of a total area of 210.78 acres, and five placer claims, which, with the exception of the placer claims, are included in the above fifty-three claims. The options held in the "Mastiff" group of Mineral Claims were abandoned early during the year 1930, and the Option covering the "Webbfoot" and "Webbfoot No. 2" Mineral Claims was relinquished on December 31st, 1930.

Ore Shipped.—During the summer months this company shipped 8,536.32 tons of ore and concentrates containing 3,634,500 ounces silver and 8,543,814 pounds lead, which had a metal value of \$1,301,513.82 for the silver; \$458,246.51 for the lead; and \$6,854.54 for the gold, which is a total value of \$1,770,887.14. In addition to the above, the Company attended to shipping the following ore for independent operators as follows:

McIver, Formo and McIntosh.....	Crude Ore.....	426.99 tons
Eleff Bjornnes.....	"	20.01 tons
Hans Formo.....	"	33.07 tons

A total of 480.07 tons, containing 162,730 ounces silver; 652,127 pounds lead; the value of which was \$56,267.20 for the silver; \$35,320.23 for the lead; a total value of \$91,587.43. The total production for the Camp in 1930, of which we have a record, was 9,016.39 tons valued at \$1,862,474.57. You will note that while the total tonnage shipped was 1,417 tons more than the 1929 shipment, the total metal value is \$414,202.41 less than we received for 1929; all of which is directly due to the extremely low metal prices now prevailing. The shipment from this Camp in 1931 will be between 4,000 and 5,000 tons of ore and concentrates.

New Equipment.—The new equipment purchased this year consisted of two Moreland, six-wheel, 10-ton trucks. They have been used all summer and to the end of December for hauling ore and concentrates from the mine to Mayo and supplies back on the return trip. A 32 by 60 foot garage was built in May to house the above trucks and other motive equipment.

For aerial prospecting a Bellanca Skyrock monoplane was purchased to accompany the Fairchild, when taking prospectors and their outfits into the field. This greatly reduces the element of risk in flying.

Air Operations.—The Fairchild, Bellanca and Moth planes made 288 flights during the year, flying 432 hours and covered 42,955 miles. They carried 319 passengers; 53,619 pounds express; and 8,120 pounds mail. The Fairchild maintained four parties, of two men each, at various places in the Territory for prospecting purposes. Nothing of consequence was found. It is planned to maintain six parties or more at this work in 1931. The air service was maintained throughout the year without accidents of any kind to the planes and no injuries were sustained by the passengers.

The Fairchild, with Pilot E. Wasson and J. A. Walsh as guide, participated in the search for the lost Burke party during the months of November and December, and were successful in finding the lost plane and party, although one of its members, Captain "Paddy" Burke, was dead.

In the Beaver River District prospecting was continued by the Consolidated Mining and Smelting Company on their properties on Silver Hill. They have made arrangements to have these claims surveyed during the coming summer.

The Assay Office at Keno has been busy. 1,148 samples were received from various parts of the Territory, and 1,786 assays or quantitative analyses were made, as well as numerous qualitative determinations and chemical tests in connection with the identification and classification of different rocks and minerals.

Yours truly,

(Sgd.) G. I. MacLEAN,
Gold Commissioner.

Table 41.—Principal Statistics of the Alluvial Gold Mining Industry in Canada, 1929 and 1930

Item	British Columbia		(a) Yukon		Canada	
	1929	1930	1929	1930	1929	1930
Number of firms and individual operators*	54	60	14	19	68	79
Time in operation—months.....	6-8	6-8	6-8	6-8	6-8	6-8
Capital employed..... \$	3,201,699	1,927,119	4,036,151	3,954,501	7,237,850	5,881,620
Number of employees.....	244	195	244	199	488	394
Salaries and wages paid.....	214,040	187,000	372,153	425,369	586,193	612,369
Fuel and electricity used..... \$	2,969	6,739	.....	1,533	2,969	8,272
Electricity generated—						
(a) for own use..... k.w.h.....	.....	.....	9,040,492	11,696,500	9,040,492	11,696,500
(b) for sale..... k.w.h.....	.....	.....	2,365,008	2,834,200	2,365,008	2,834,200
Value of electricity sold..... \$	.....	.....	23,650	28,342	23,650	28,342
Crude gold recovered..... crude oz.	6,447	8,955	44,598	43,950	51,045	52,905
Value of gold and silver..... \$	109,599	152,235	724,708	724,772	834,307	877,007
Platinum recovered..... crude oz.	28	17	.....	.....	28	17
Value of platinum recovered..... \$	1,699	771	.....	.....	1,699	771
Quantity of material handled..... cubic yd.	1,336,390	224,339	4,500,000	3,559,642	5,836,390	3,783,981
Length of ditches..... miles	93	105	56	121	149	226
Total value of alluvial gold production..... \$	111,298	153,006	724,708	724,772	836,006	877,778

*In addition to the number shown in the table there were many individual operators from whom no returns were available. (a) Includes one company operating but not producing in Quebec during 1930.

4. The Auriferous Quartz Mining Industry.

This industry includes the mining and milling of ores in which gold is the predominating metal, quartz the prevailing gangue and from which the values are usually recovered by various methods of cyanidation or amalgamation. Refractory ores containing lead, copper, arsenic, antimony or other metals are usually concentrated by selective flotation or other methods and the gold bearing concentrates shipped to smelters for further treatment. Gold occurs in Nova Scotia in both free milling ores and in association with arsenic and antimony. In northwestern Quebec three mines operated in 1930 on free milling quartz ores; the Siscoe was a steady producer throughout the year, over 90 tons of ore per day were mined and milled with a recovery by amalgamation and cyanide of \$11.11 in gold per ton; towards the end of June the new 75-ton mill at the Granada commenced operations; it is reported that the ore averaged over \$14 in gold. At this plant the pulp is passed over plates on which blankets are spread; this treatment results in an almost complete recovery of gold; several shipments of high grade gold ore were made from the O'Brien mine in Cadillac township, and in Barraute township construction of a twenty-five ton mill was commenced at the Venus mine. The majority of the larger gold mines in Ontario have adopted straight cyanidation, a few of the smaller producers make recoveries only by amalgamation and in some mills a combination of the two methods has been adopted. There is, in the ores from the large Ontario mines, an average proportion of 7 ounces of gold to 1 of silver. A greater variety of gold ores are usually mined in British Columbia than in any of the other provinces. As a general rule each ore with its own peculiar mineral characteristics requires its own individual extraction methods. The high-grade gold-silver-lead ores of the Premier mine are concentrated and the products shipped to other plants for smelting and recovery of the precious metals.

Table 42.—Capital Employed by Provinces in the Auriferous Quartz Mining Industry in Canada, 1929 and 1930

—	*Nova Scotia		Ontario		British Columbia		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$
1929								
Producing.....	6	7,932,009	21	85,547,367	11	14,440,638	38	107,920,014
Operating but not producing.....	10	6,588,356	31	19,303,330	6	1,354,405	47	27,246,091
Total.....	16	14,520,365	52	104,850,697	17	15,795,043	85	135,166,105
1930								
Producing.....	8	10,653,860	20	89,637,363	9	12,136,291	37	112,427,514
Operating but not producing.....	1	89,000	15	6,871,788	3	369,755	19	7,330,543
Total.....	9	10,742,860	35	96,509,151	12	12,506,046	56	119,758,057

*Includes data for 1 producing and 2 non-producing in Manitoba in 1929, and for 2 producing and 4 non-producing in Quebec in 1929, also for three producing mines in Quebec in 1930 and 1 producing and one non-producing in Manitoba.

Table 43.—Ores Mined and Milled, Crude Bullion Produced and Shipped from the Auriferous Quartz Mines in Canada, by Provinces, 1929 and 1930

	*Nova Scotia	Ontario	British Columbia	Canada
1929				
Number of producing mines.....	6	21	11	38
Ore mined..... tons	88,057	3,952,027	314,660	4,254,744
Ore milled..... tons	91,404	3,952,535	209,055	4,253,994
Tailings re-treated..... tons	17,633	7,290	41,417	45,707
Bullion recovered by amalgamation..... crude oz.	66,606	144,294	295	162,222
Bullion recovered by cyanidation..... crude cz.	85,283	1,802,155	24,999	1,893,760
Bullion shipped..... crude oz.	42,779	1,977,103	25,294	2,087,680
Content of bullion shipped—Gold..... fine oz.	3,921	1,609,544	17,600	1,669,932
Silver..... fine oz.		256,256	1,363	261,540
Value..... \$	862,660	33,406,105	325,342	34,594,107
Exchange premium..... \$	767	157,464	3	158,234
Net value of ores, slags and residues sold..... \$	8,796	14,076	2,500,773	2,523,645
Total net receipts..... \$	872,223	33,577,645	2,826,118	37,275,986
1930				
Number of producing mines.....	8	20	9	37
Ore mined..... tons	115,995	3,972,692	384,116	4,472,803
Ore milled..... tons	91,838	3,946,590	268,441	4,306,869
Tailings re-treated..... tons	25,877	85	37,010	37,095
Bullion recovered by amalgamation..... crude oz.	47,817	33,592	1,156	60,625
Bullion recovered by cyanidation..... crude oz.	63,304	2,179,302	48,007	2,275,126
Bullion shipped..... crude oz.	40,224	2,213,302	49,163	2,325,769
Content of bullion shipped—Gold..... fine oz.	4,375	1,711,155	31,177	1,782,556
Silver..... fine oz.		293,440	2,593	300,408
Value..... \$	832,557	35,480,663	621,554	36,934,774
Exchange premium..... \$	5	36,702		36,707
Net value of ores, slags and residues sold..... \$	8,013	22,922	2,769,323	2,800,258
Total net receipts..... \$	840,575	35,540,287	3,390,877	39,771,739

*Includes data on 1 mine in Manitoba and 2 in Quebec in 1929 also 1 mine in Manitoba and 3 in Quebec in 1930.

Table 44.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1929 and 1930

Item	*Ontario mines shipping		†British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
1929					
Number of mines.....	2	3	6	4	13
Tons of ore, etc. shipped.....	269	44	27,278	93,203	120,794
Metal content—					
Gold..... oz.	329	714	14,327	86,224	101,594
Silver..... oz.	766	218	389,450	2,035,899	2,426,333
Copper..... lb.	9,605	206			9,811
Lead..... lb.			2,945	160,000	162,945
Zinc..... lb.					
Arsenic..... lb.				1,487,175	1,487,175
Net value..... \$	8,198	14,674	341,265	2,159,508	2,523,645
1930					
Number of mines.....	6	3	6	3	17
Tons of ore, etc., shipped.....	40	49	53,689	88,777	142,555
Metal content—					
Gold..... oz.	442	920	32,250	68,623	102,235
Silver..... oz.	1,708	5,680	1,196,405	3,280,348	4,484,141
Copper..... lb.	2,382	491			2,873
Lead..... lb.			16,336	2,146,406	2,162,742
Zinc..... lb.					
Arsenic..... lb.				1,773,333	1,773,333
Net value..... \$	9,736	21,199	791,805	1,977,518	2,800,258

*Includes data for 1 mine in Quebec in 1929 also 1 mine in Quebec and 1 in Manitoba in 1930.

†2 mines in British Columbia in 1929 shipped to both Canadian and foreign smelters and in 1930 1 mine in British Columbia shipped to Canadian and foreign smelters.

Table 45.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada by Provinces, 1929 and 1930

Province	1929						1930					
	Number of employees					Salaries and wages	Number of employees					Salaries and wages
	On salary	Wage-earners			Total employees		On salary	Wage-earners			Total employees	
		Surface	Under-ground	Mill				Surface	Under-ground	Mill		
Nova Scotia.....	11	23	27	5	66	\$ 48,321	2	19	14	4	39	\$ 13,395
Quebec.....	37	101	75	7	220	340,185	18	86	78	18	200	353,602
Ontario.....	386	1,805	4,708	570	7,469	12,333,389	371	1,664	4,741	581	7,357	12,226,108
Manitoba.....	14	49	98	13	174	376,721	9	34	73	14	130	247,684
British Columbia.....	76	240	315	100	731	1,160,117	66	214	282	113	675	1,193,831
Canada.....	524	2,218	5,223	695	8,660	14,258,733	466	2,017	5,188	730	8,401	14,034,620

Table 46.—Wage-Earners in the Auriferous Quartz Mining Industry in Canada by Months, 1929 and 1930

Month	1929				1930			
	Mine			Total	Mine			Total
	Surface	Under-ground	Mill		Surface	Under-ground	Mill	
January.....	2,086	5,001	606	7,693	1,721	4,876	566	7,163
February.....	2,102	5,026	616	7,744	1,735	4,808	557	7,100
March.....	2,087	5,053	636	7,776	1,720	4,850	549	7,119
April.....	2,067	5,097	655	7,819	1,784	4,922	622	7,328
May.....	2,079	5,193	663	7,935	1,944	4,931	640	7,515
June.....	2,157	5,046	656	7,859	1,978	5,060	648	7,686
July.....	2,196	5,062	672	7,930	2,031	5,187	673	7,891
August.....	2,127	5,180	680	7,987	2,108	5,111	669	7,888
September.....	2,118	5,165	681	7,964	2,079	5,104	666	7,849
October.....	2,176	5,228	698	8,102	2,057	5,148	674	7,879
November.....	1,996	5,081	682	7,759	1,972	5,288	733	7,993
December.....	1,883	4,845	610	7,338	1,902	5,342	669	7,913

5. The Copper-Gold-Silver Mining Industry.

Many of the ores in which copper values predominate are often mineral combinations or intergrowths of the metal bearing sulphides, pyrite, pyrrhotite and chalcopyrite. Zinc blende is often a common additional component. These sulphide ores often contain important gold, silver and other precious metal values which are recovered as by-products in the production of refined copper from ores mined in the copper-gold-silver mining industry. The precious metals in these ores are a very deciding factor, especially in periods of depressed base metal prices, in the economic working of deposits of this nature.

In Quebec the Consolidated Copper and Sulphur Company, Ltd., operating the Eustis mine, produced both copper and iron sulphide concentrates throughout 1930; at the Noranda the total tonnage of ore treated was double that of 1929 and notwithstanding the drawing of approximately 850,000 tons of ore from the mine, the ore reserves at the end of 1930 show an increase of slightly over 1,500,000 tons as compared with the ore reserves at the close of the previous year; operations at this company's subsidiary, Waite-Ackerman-Montgomery Mines,

was almost entirely confined to exploration. This added several hundred thousand tons to the ore reserves of the mine. The Amulet mine was brought into production early in the year and within a few months the concentrator was handling as high as 400 tons of ore per day. The property was closed down in October owing to exceptionally low copper and zinc prices.

Construction on the copper refinery of Noranda's subsidiary, Canadian Copper Refiners, Ltd., located in the town of Montreal East, Quebec, neared completion in 1930; all copper produced at Noranda smelter is now being shipped to the new refinery. This plant will possess a refinery capacity of 75,000 tons of electrolytic copper per annum. Noranda acquired during 1930 a substantial interest in Canada Wire and Cable Company, Ltd. This latter company is erecting a rod mill and wire drawing plant adjacent to the Montreal refinery.

The new electrolytic copper refinery of the Ontario Refining Company, Ltd., at Copper Cliff, was started successfully in mid-year and later produced approximately 6,000 tons of copper per month. Gold and silver contained in ores from the Frood and Garson mines are recovered at this plant and blister copper from both Ontario and British Columbia smelters is treated. Proven ore reserves of the International Nickel Company at the end of 1930 aggregated 206,704,000 tons; during the year additional ore reserves amounting to 2,416,000 tons were established below the 2,000 foot level of the Frood mine; this ore grades 4.93 per cent copper and 3.53 per cent nickel.

In Manitoba on June 1, 1930, the first of the three 14,000 horsepower units of the Hudson Bay Mining and Smelting Company's power development, situated at Island Falls, was brought into operation and on June 12th the entire construction load at the Flin Flon mine was taken over by this plant. The first unit of the new Flin Flon concentrator was operated on August 1st; in the latter part of September the roasters in the zinc plant were started and the entire works was gradually brought into operation with the production of the first zinc slabs in November; the copper roasters and reverberatory were started near the end of October resulting in a regular production of blister copper in December. At the Sherritt Gordon mine the main working shaft in the west ore zone was sunk a total of 680 feet, the crushing installation completed below the third level, and other parts of the mining plant and power system practically completed in October.

The principal copper properties operating in British Columbia in 1930 were the Hidden Creek and Bonanza mines at Anyox, the Copper Mountain mine near Princeton, and the Britannia mine on Howe Sound. Sulphide ores from the Hidden Creek and Bonanza mines are smelted at the plant of the Granby Consolidated Mining, Smelting and Power Company in Anyox. Operations and export of copper concentrates by the Copper Mountain mine at Allenby, were seriously affected by the falling price of copper and the mine was closed down on November 15. Tonnage treated at the Britannia mine exceeded 2,000,000 tons resulting in the largest output of copper ever made by this company. Operations at the property were curtailed towards the close of the year in conformity with the international policy of reduction in copper production. Considerable development work and diamond drilling were accomplished during the year by the Coast Copper Company, Ltd. It is stated that present ore reserves justify the construction of a concentrating plant. This property is prepared to commence production at any time.

Important discoveries of high grade copper ores were reported to have been made in 1929 and 1930 in areas adjacent to Great Bear Lake and the Copper Mine River in MacKenzie district, Northwest Territories.

In 1930 the average New York price for electrolytic copper was 12.982 cents per pound as against 18.107 cents in 1929.

Because of interplant relations, companies which mine and smelt their own ore sometimes have difficulty in making a separation of the capital employed at the mine and smelter; also the value placed on their own ore at the mine may be nominal and any profit accruing from the operations would appear to be credited to the smelter. For that reason the net value placed on shipments to the smelter may not be the same as the value computed from the metal content as determined by settlement assay.

Table 47.—Capital Employed by Provinces in the Copper-Gold-Silver Mining Industry in Canada, 1929 and 1930

	Quebec		Ontario		Manitoba		British Columbia		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1929										
Producing.....	6		7				13		26	20,552,263
Operating but not producing.....	95		3		3		25		126	31,994,434
Total.....	101	14,288,825	10	7,649,632	3	6,083,677	38	24,524,563	152	52,546,697
1930										
Producing.....	7	4,469,675	1		1	8,154,584	7	15,098,582	16	27,722,841
Operating but not producing.....	30	4,533,415	4	5,869,743	1	6,245,387	17	1,473,009	52	18,121,554
Total.....	37	9,003,090	5	5,869,743	2	14,399,971	24	16,571,591	68	45,844,395

Table 48.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1929 and 1930

	*Quebec	British Columbia	Canada
	Tons	Tons	Tons
1929			
Ore mined.....	520,652	4,614,172	5,134,824
Ore milled.....	102,194	4,410,612	4,512,806
Copper concentrates produced.....	20,546	242,395	262,941
Pyrite concentrates produced.....	20,186	56,395	76,581
1930			
Ore mined.....	1,339,866	4,428,798	5,768,664
Ore milled.....	579,252	4,347,179	4,926,431
Copper concentrates produced.....	92,370	205,715	298,085
Pyrite concentrates produced.....	24,918	28,535	53,453
Zinc concentrates produced.....	35,459	36,653	72,112

*Contains a small quantity of ore mined in Ontario in 1929 and in 1930 includes data on copper-gold ores mined and milled in Manitoba.

Table 49.—Shipments from Copper-Gold-Silver Mines of Canada, 1929 and 1930

Destination	Quantity	Net value	Content as determined by settlement assay				
			Gold	Silver	Copper	Sulphur	Zinc
	Tons	\$	Fine oz.	Fine oz.	Pounds	Tons	Pounds
1929							
18 mines shipped to Canadian smelters—							
Ores.....	570,791	6,709,550	67,008	432,951	57,063,264		
Copper concentrates.....	117,744	4,275,044	9,914	227,113	35,814,481		
8 mines shipped to Foreign smelters—							
Ores.....	3,352	57,913	192	5,876	333,719		
Copper concentrates.....	145,197	10,639,950	20,054	380,834	69,554,222		
Pyrite concentrates.....	76,581	177,450				38,203	
Total.....	913,665	21,859,907	97,168	1,046,774	162,765,686	38,203	
1930							
11 mines shipped to Canadian smelters—							
Ores.....	724,966	4,049,084	109,043	437,034	70,487,335		1,748,920
Copper concentrates.....	172,772	4,425,673	39,583	659,875	46,921,698		
Zinc concentrates.....	20,800	208,000	2,870	52,950	767,000		13,478,000
10 mines shipped to Foreign smelters—							
*Ores.....	391	3,513	31	456	26,023		
†Copper concentrates.....	126,250	6,743,510	16,877	335,134	65,656,756		
Pyrite concentrates.....	53,453	145,084				27,682	
Zinc concentrates.....	11,082	54,700					11,527,280
Total.....	1,109,714	15,629,564	168,404	1,485,449	183,858,812	27,682	26,751,200

*Contains 1,003 pounds of nickel, 4 ounces of platinum and 14 ounces of palladium.

†Contains 690,111 pounds of copper in precipitates.

Table 50.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, 1929 and 1930

	1929		1930	
	Number	Salaries and wages	Number	Salaries and wages
		\$		\$
SALARIED EMPLOYEES—				
Total.....	430	900,605	285	724,275
WAGE-EARNERS—				
Surface.....	2,077	7,598,150	1,803	8,432,484
Underground.....	2,277		3,097	
Mill.....	459		509	
Total.....	4,813	7,598,150	5,409	8,432,484
Grand total.....	5,243	8,498,755	5,694	9,156,759

Table 51.—Wage-Earners in the Copper-Gold-Silver Mining Industry in Canada by Months, 1929 and 1930

Month	1929				1930			
	Mine		Mill	Total	Mine		Mill	Total
	Surface	Underground			Surface	Underground		
January.....	1,528	2,023	449	4,000	1,557	3,214	585	5,356
February.....	1,597	2,087	454	4,138	1,544	3,320	568	5,432
March.....	1,624	2,026	425	4,075	1,503	3,307	588	5,398
April.....	1,588	2,058	445	4,091	1,600	3,336	478	5,414
May.....	1,804	2,151	452	4,407	2,098	2,946	463	5,507
June.....	1,863	2,185	486	4,534	2,234	3,178	465	5,877
July.....	1,883	2,198	477	4,558	2,279	3,105	455	5,839
August.....	1,900	2,273	474	4,647	1,901	2,964	482	5,347
September.....	1,994	2,319	484	4,797	1,735	2,856	458	5,049
October.....	1,828	2,344	471	4,643	1,556	2,802	480	4,838
November.....	1,750	2,308	482	4,540	1,029	2,654	415	4,098
December.....	1,482	2,132	450	4,064	936	2,511	332	3,779

Table 52.—Production of Gold in Canada by Provinces and by Sources, 1929 and 1930

Province	1929		1930	
	Fine ounces	Value	Fine ounces	Value
NOVA SCOTIA—		\$		\$
In gold bullion and in concentrates exported.....	2,687	55,545	1,272	26,295
QUEBEC—				
In blister copper, in gold bullion and in any ores exported.....	90,798	1,876,961	141,747	2,930,170
ONTARIO—				
Porcupine area—In gold bullion.....	932,709	19,280,805	858,603	17,748,899
In slags exported.....	23	475	481	9,943
Kirkland lake area—In gold bullion.....	678,745	14,030,904	830,293	17,163,679
In slags exported.....	759	15,690	440	9,096
Sudbury area—In blister copper and in matte and ores exported.....	7,802	161,282	23,803	492,051
Miscellaneous.....	2,229	46,078	22,392	462,884
Total.....	1,622,267	33,535,234	1,736,012	35,886,552
MANITOBA—				
In gold bullion and in blister copper.....	22,455	464,186	23,189	479,359
ALBERTA.....	5	103		
BRITISH COLUMBIA—				
In alluvial gold.....	5,158	106,626	7,164	148,093
In gold bullion.....	17,609	364,010	31,177	644,486
In blister copper.....	13,405	380,465	25,799	533,313
In base bullion and in ores exported.....	113,032	2,336,579	100,191	2,071,131
Total.....	154,204	3,187,680	164,331	3,397,023
YUKON—				
In alluvial gold.....	35,678	737,530	35,160	726,822
In ores exported.....	214	4,424	357	7,380
Total.....	35,892	741,954	35,517	734,202
Total Canada.....	1,928,308	39,861,663	2,102,068	43,453,601

Table 53.—Production of Gold in Canada, 1858-1930

Year	Fine ounces*	Value	Year	Fine ounces*	Value	Year	Fine ounces*	Value
		\$			\$			\$
1858.....	34,104	705,000	1882.....	60,288	1,246,268	1906.....	556,415	11,502,120
1859.....	78,129	1,615,072	1883.....	53,853	1,113,246	1907.....	405,517	8,382,780
1860.....	107,806	2,228,543	1884.....	51,202	1,058,439	1908.....	476,112	9,842,105
1861.....	128,973	2,666,118	1885.....	55,575	1,148,829	1909.....	453,865	9,382,230
1862.....	135,391	2,798,774	1886.....	70,782	1,463,196	1910.....	493,707	10,205,835
1863.....	202,498	4,186,011	1887.....	57,460	1,187,804	1911.....	473,159	9,781,077
1864.....	199,605	4,126,199	1888.....	53,145	1,098,610	1912.....	611,885	12,648,794
1865.....	192,898	3,987,562	1889.....	62,653	1,295,159	1913.....	802,973	16,598,923
1866.....	152,555	3,153,597	1890.....	55,620	1,149,776	1914.....	773,178	15,983,007
1867.....	145,775	3,013,431	1891.....	45,018	930,614	1915.....	918,056	18,977,901
1868.....	134,169	2,773,527	1892.....	43,905	907,601	1916.....	930,492	19,234,976
1869.....	102,720	2,123,405	1893.....	47,243	976,603	1917.....	738,831	15,272,992
1870.....	83,415	1,724,348	1894.....	54,600	1,128,688	1918.....	699,681	14,463,689
1871.....	105,187	2,174,412	1895.....	100,798	2,083,674	1919.....	766,764	15,850,423
1872.....	90,283	1,866,321	1896.....	133,262	2,754,774	1920.....	765,007	15,814,098
1873.....	74,346	1,536,871	1897.....	291,557	6,027,016	1921.....	926,329	19,148,920
1874.....	97,856	2,022,862	1898.....	666,386	13,775,420	1922.....	1,263,364	26,116,050
1875.....	130,300	2,693,533	1899.....	1,028,529	21,261,584	1923.....	1,233,341	25,495,421
1876.....	97,729	2,020,233	1900.....	1,350,057	27,908,153	1924.....	1,525,382	31,532,443
1877.....	94,304	1,949,444	1901.....	1,167,216	24,128,503	1925.....	1,735,735	35,880,826
1878.....	74,420	1,538,394	1902.....	1,032,161	21,336,667	1926.....	1,754,228	36,263,110
1879.....	76,547	1,582,358	1903.....	911,559	18,843,590	1927.....	1,852,785	38,300,464
1880.....	63,121	1,304,824	1904.....	796,374	16,462,517	1928.....	1,890,592	39,082,005
1881.....	63,524	1,313,153	1905.....	684,951	14,159,195	1929.....	1,928,308	39,861,663
						1930.....	2,102,068	43,453,601
Total.....							37,617,623	777,625,371

*Calculated from the value \$1=0.048375 ounces.

Refined Gold.—Two refineries produced fine gold in Canada in 1930, the Royal Mint, Ottawa, and the Consolidated Mining and Smelting Company of Canada, Limited, at Tadanac, near Trail, B.C. In 1930, the latter plant produced 25,719 fine ounces. This gold was recovered chiefly in the treatment of silver-lead ores and, to a lesser extent, blister copper. Small quantities of imported ores containing gold values are also treated at Tadanac.

Gold refined at the Royal Mint at Ottawa from crude metal or bullion produced in Nova Scotia, Quebec, Ontario, Manitoba, Alberta and British Columbia, and from alluvial recoveries, amounted to 862,075 fine ounces. This amount includes a comparatively small quantity obtained from scrap. The total production in Canada of refined gold during 1930 was 887,794 fine ounces.

The precious metals refining section of the new electrolytic copper refinery of the Ontario Refining Company, Ltd., at Copper Cliff, Ontario, is expected to be in operation early in 1931.

Table 54.—Refined Gold Produced at Trail, B.C., 1921-1930*

(For years 1904 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Fine ounces	Year	Fine ounces
1921.....	56,297	1926.....	49,607
1922.....	18,940	1927.....	29,334
1923.....	11,113	1928.....	22,754
1924.....	23,412	1929.....	14,643
1925.....	18,441	1930.....	25,719

*Includes some gold derived from imported ores and from occasional shipments from Ontario, Manitoba, Alberta, and the Yukon.

Table 55.—Receipts at the Royal Mint, Ottawa, Ont., by Sources, 1929 and 1930

Source	1929			1930		
	Gross weight	Precious metal content		Gross weight	Precious metal content	
		Fine gold	Fine silver		Fine gold	Fine silver
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
Nova Scotia.....	2,927.88	2,686.77	131.67	1,382.63	1,272.052	66.94
Quebec.....	15,383.37	13,326.25	842.65	26,264.37	22,905.661	1,936.81
Ontario.....	412,057.63	328,556.13	54,067.83	908,209.45	712,527.229	86,418.76
Manitoba.....	68,923.47	25,809.12	2,948.32	36,373.08	16,118.436	1,841.39
Alberta.....	5.68	5.23	0.37			
British Columbia.....	39.87	24.13	12.14	47.43	30.976	14.08
Dominion of Canada Assay Office,						
Vancouver.....	67,023.52	54,060.96	7,839.23	115,459.86	94,592.486	14,762.05
Yukon.....	37.05	32.27	3.72	2.72	2.283	0.29
Jewellery and scrap, various sources.....	35,130.59	14,350.36	7,569.50	34,004.48	14,625.742	4,350.94
Total.....	601,529.06	438,351.22	73,415.43	1,121,744.02	862,074.865	109,391.26

Table 56.—Crude Bullion Received at Dominion Government Assay Office, Vancouver, B.C., 1921-1930

(For years 1908 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Weight before melting	Weight after melting	Net value	Year	Weight before melting	Weight after melting	Net value
	Ounces	Ounces	\$		Ounces	Ounces	\$
1921.....	163,070.56	160,803.48	2,834,499.61	1926.....	162,606.56	145,279.61	2,524,337.58
1922.....	129,891.63	125,758.41	2,105,989.64	1927.....	108,080.89	102,192.93	1,750,599.35
1923.....	129,043.63	124,546.48	2,051,369.65	1928.....	107,617.27	98,392.98	1,673,926.65
1924.....	114,041.96	107,569.15	1,850,373.74	1929.....	69,985.84	61,249.57	1,032,128.51
1925.....	140,691.78	123,202.39	2,065,217.16	1930.....	133,439.62	119,646.21	2,030,897.84

Table 57.—Quantity of Gold produced in Canada, by Provinces, 1920-1930

(For the years 1862 to 1919, see Mineral Production of Canada, 1928)

Year	Nova Scotia	Quebec*	Ontario	Manitoba	Alberta	British Columbia	Yukon
	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.
1920.....	690	955	564,995	781		124,808	72,778
1921.....	439	635	708,213	207	49	150,792	65,994
1922.....	1,042		1,000,340	156		207,370	54,456
1923.....	655	667	971,704	81		200,140	60,144
1924.....	1,047	883	1,241,728	1,180		245,719	34,825
1925.....	1,626	1,602	1,461,039	4,424		219,227	47,817
1926.....	1,678	3,680	1,497,215	188		225,866	25,601
1927.....	3,151	8,331	1,627,050	182	42	183,094	30,935
1928.....	1,290	60,006	1,578,434	19,813	68	196,617	34,364
1929.....	2,687	90,798	1,622,267	22,455	5	154,204	35,892
1930.....	1,272	141,747	1,736,012	23,189		164,331	35,517

Table 58.—Value of Gold Produced in Canada, by Provinces, 1920-1930

(For the years 1862 to 1919 see Mineral Production of Canada, 1928)

Year	Nova Scotia	Quebec	Ontario	Manitoba	Alberta	British Columbia	Yukon
	\$	\$	\$	\$	\$	\$	\$
1920.....	14,263	19,742	11,679,483	16,145		2,580,010	1,504,455
1921.....	9,075	13,127	14,640,062	4,279	1,013	3,117,147	1,364,217
1922.....	21,540		20,678,862	3,225		4,286,718	1,125,705
1923.....	13,540	13,788	20,086,904	641		4,137,261	1,243,287
1924.....	21,643	18,253	25,668,795	24,393		5,079,462	719,897
1925.....	33,612	33,116	30,202,357	91,452		4,531,824	988,465
1926.....	34,687	76,072	30,950,180	3,886		4,669,065	529,220
1927.....	65,137	172,217	33,634,108	3,762	868	3,784,889	639,483
1928.....	26,667	1,240,434	32,629,126	409,571	1,406	4,064,434	710,367
1929.....	55,545	1,876,961	33,535,234	464,186	103	3,187,680	741,954
1930.....	26,295	2,930,170	35,886,552	479,359		3,397,023	734,202

Table 59.—Production of Gold, in British Columbia by Districts, 1929 and 1930

(From *Annual Report of the Minister of Mines for British Columbia*)

District and division	1929				1930			
	Gold alluvial*		Gold lode		Gold alluvial		Gold lode	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		\$		\$		\$		\$
Northwestern District (No. 1)—								
Atlin.....	2,408	40,936			3,141	53,397		
Stikine.....	38	646						
Liard.....	340	5,780			322	5,474		
Nass River.....			4,671	96,558			3,207	66,295
Portland Canal.....			96,676	1,998,467			87,492	1,808,620
Skeena.....	18	306	69	1,426	33	561		
Queen Charlotte.....	9	153			19	323		
Bella Coola.....								
Northeastern District (No. 2)—								
Cariboo.....	2,495	42,415			2,499	42,483		
Quesnel.....	1,201	20,417			2,187	37,179		
Omineca.....	120	2,040	226	4,672	147	2,499	95	1,964
Peace River.....	120	2,040			147	2,499		
Central District (No. 3)—								
Nicola.....			794	16,413			3,295	68,114
Vernon.....					16	272		
Yale.....	20	340	1	21	1	17	398	8,227
Ashcroft.....								
Kamloops.....			128	2,646	50	850		
Lillooet.....			5,061	104,620			18,067	373,478
Clinton.....	109	1,853			83	1,411		
Southern District (No. 4)—								
Grand Forks.....							9,488	196,134
Greenwood.....			141	2,915			79	1,633
Osoyoos.....			14,217	293,891			11,136	230,202
Similkameen.....	75	1,275	5,924	122,460	76	1,292	4,276	88,393
Eastern District (No. 5)—								
Fort Steele (a).....	27	459	227	4,692	7	119		
Windermere.....			2	41				
Golden.....	3	51					4	83
Ainsworth.....			96	1,984			2	41
Slocan.....			156	3,225			30	620
Slocan City.....								
Nelson.....			2,465	50,956	2	34	9,995	206,615
Arrow Lake.....								
Trail Creek.....			164	3,391			1134	2,770
Revelstoke.....					211	3,587		
Trout Lake.....					11	187		
Lardeau.....			2	41			1	21
Western District (No. 6)—								
Nanaimo.....			25	517				
Alberni.....			4	83				
Clayoquot.....							17	351
Quatsino.....								
Victoria.....					3	51		
New Westminster.....								
Vancouver.....			14,290	295,400			13,062	270,015
Total.....	6,983	118,711	145,339	3,004,419	8,955	152,235	160,778	3,323,576

*Alluvial gold is valued at \$17 an ounce, which is believed to be a fair average for the whole province.

†Production from slags and residues at Trail plant, which cannot be credited to individual mines.

‡Includes 4,226 oz. produced in 1929 but not credited in that year.

(a) Includes some production from Sullivan mine in 1929; zinc concentrates not treated until 1930.

Table 60.—Receipts from the Yukon, at the Dominion of Canada Assay Office, Vancouver, B.C., 1921-1930

(For years 1908 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Weight before melting	Net value	Average value	Year	Weight before melting	Net value	Average value
	Ounces	\$	\$		Ounces	\$	\$
1921.....	82,219.92	1,340,225	16.30	1926.....	32,686.16	537,822	16.46
1922.....	69,161.19	1,126,702	16.29	1927.....	39,436.44	649,402	16.47
1923.....	73,360.82	1,201,133	16.37	1928.....	42,993.43	693,765	16.13
1924.....	44,365.96	717,156	16.17	1929.....	7,970.97	120,826	15.16
1925.....	61,096.43	977,624	16.00	1930.....	41,949.03	694,449	16.55

Table 61.—Production of Alluvial Gold in the Yukon by Months, 1928-1930

(Gross weight of dust, nuggets, and bullion in ounces)

Month	1928	1929	1930
January.....	532-96	1,346-69	1,023-08
February.....	183-44	394-21	186-21
March.....	359-21	334-17	103-58
April.....	465-49	607-02	663-21
May.....	686-79	567-84	1,229-81
June.....	5,189-72	5,898-27	4,156-14
July.....	5,692-05	5,013-00	5,760-37
August.....	6,589-03	6,633-90	5,546-22
September.....	10,846-02	8,074-13	8,560-83
October.....	5,383-91	8,063-48	12,474-87
November.....	4,023-29	5,526-79	2,476-52
December.....	2,693-46	2,138-50	1,768-77
Total.....	42,645-37	44,598-00	43,949-61

From 1898 to March 31, 1930, royalties to the extent of \$4,960,403 were collected on the gold production of the Yukon. The yearly amounts collected, as well as the annual production of gold as ascertained by the *Department of the Interior*, are shown below. The difference between these figures and those shown in the table of annual production, which are based on mint receipts of Yukon gold is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at \$15 per ounce, (2) the probability that, in the earlier years of royalty collection, considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small production from lode mines.

Table 62.—Gold Production in the Yukon and the Royalty Collected, 1921-1931

(Supplied by the Mining Lands Branch of the Department of the Interior.)

(For years 1898 to 1920 see 1928 report on the Mineral production of Canada.)

Fiscal year	Total gold production	Total exemption	Royalty collected on	Royalty paid
	\$	\$	\$	\$
Ending March, 1921.....	1,246,486	.....	1,246,486	31,273-76
Ending March, 1922.....	1,230,987	.....	1,230,987	30,774-68
Ending March, 1923.....	1,032,762	.....	1,032,762	25,819-04
Ending March, 1924.....	1,136,368	.....	1,136,368	28,409-23
Ending March, 1925.....	625,459	.....	625,459	15,636-48
Ending March, 1926.....	879,819	.....	879,819	21,985-50
Ending March, 1927.....	497,504	.....	497,504	12,437-64
Ending March, 1928.....	568,221	.....	568,221	14,205-55
Ending March, 1929.....	654,672	.....	654,672	16,366-79
Ending March, 1930.....	657,537	.....	657,537	16,438-42
Ending March, 1931.....	654,925	.....	654,925	16,372-41

Table 63.—Imports into Canada and Exports of Gold, 1928-1930

	1928	1929	1930
	\$	\$	\$
IMPORTS—			
Coin and bullion—			
Coins, British, Canadian and foreign gold coins.....	27,654,313	2,856,947	38,369,019
Gold bullion, in bars, blocks, ingots, drops, sheets or plates, unmanufactured....	925,612	889,541	693,090
Total.....	28,579,925	3,746,488	39,062,109
Gold, other—			
Bullion or fringe gold.....	47,537	37,401	18,543
Manufactures of gold and silver—			
Leaf.....	127,085	124,296	106,116
Sweepings.....	168	564	1,000
Manufactures, n.o.p.....	58,275	78,939	66,669
Electroplated ware.....	1,282,513	1,410,202	1,014,645

Table 63.—Imports into Canada and Exports of Gold, 1928-1930—Concluded

	1928	1929	1930
IMPORTS—	\$	\$	\$
Gold, other—			
Medals of gold, silver or copper, and other metallic articles, actually bestowed as trophies or prizes, and received and accepted as honorary distinctions, and cups or other metallic prizes won in bona fide competitions.....	17,143	24,016	24,558
Total.....	1,532,721	1,675,418	1,231,531
EXPORTS—			
Coin and bullion—			
Gold coin—			
Canadian.....		25	750
Foreign.....	56,121,042	29,252,140	18,004,160
Gold bullion—			
Canadian.....	48,914,498	409,577	
Foreign.....			
Total—Canadian.....	48,914,498	409,602	750
Foreign.....	56,121,042	29,252,140	18,004,160
Gold-bearing quartz, dust, nuggets and bullion obtained direct from mining operations.....	10,457,877	29,995,983	22,312,605
Jewellers' sweepings (gold, silver and platinum).....	436,939	423,642	380,379

WORLD OUTPUT

Table 64.—Comparative Figures of Gold Production, for the World, South Africa, United States and Canada, 1898-1930

Year	*World's output	†Union of South Africa output	*United States' output	Canada's output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1898.....	13,904,363	3,823,307	3,118,398	666,386
1899.....	14,837,775	3,637,713	3,437,210	1,028,529
1900.....	12,315,135	348,761	3,829,897	1,350,057
1901.....	12,740,746	258,032	3,805,500	1,167,216
1902.....	14,554,680	1,718,921	3,870,000	1,032,161
1903.....	15,768,387	2,971,427	3,560,000	911,559
1904.....	16,780,913	3,770,996	3,892,480	796,374
1905.....	18,396,451	4,908,281	4,265,742	684,951
1906.....	19,471,080	5,793,159	4,565,333	556,415
1907.....	19,997,280	6,452,180	4,374,827	405,517
1908.....	21,430,438	7,057,100	4,574,340	476,112
1909.....	21,982,713	7,296,832	4,821,701	453,865
1910.....	22,022,180	7,531,386	4,657,017	493,707
1911.....	22,348,813	8,251,240	4,687,053	473,159
1912.....	22,549,335	9,108,792	4,529,719	611,885
1913.....	22,249,596	8,798,713	4,299,784	802,973
1914.....	21,240,416	8,396,068	4,572,976	773,178
1915.....	22,760,788	9,096,411	4,887,604	918,056
1916.....	22,107,669	9,296,964	4,479,057	930,492
1917.....	20,289,546	9,018,389	4,051,440	738,831
1918.....	18,556,920	8,415,379	3,320,784	699,681
1919.....	17,695,037	8,331,651	2,918,628	766,764
1920.....	16,205,029	8,158,455	2,476,166	765,007
1921.....	15,974,962	8,128,710	2,422,006	926,329
1922.....	15,451,945	7,009,858	2,289,235	1,263,364
1923.....	17,790,597	9,149,073	2,426,495	1,233,341
1924.....	19,031,001	9,575,040	2,446,338	1,525,382
1925.....	19,025,942	9,597,592	2,319,920	1,735,735
1926.....	19,349,118	9,954,762	2,238,616	1,754,228
1927.....	19,397,757	10,122,491	2,117,253	1,852,785
1928.....	19,755,622	10,354,264	2,144,720	1,890,592
1929.....	19,600,152	*10,412,326	2,056,629	1,928,308
1930.....	20,200,000	10,716,351	2,100,395	2,102,068

* Figures taken from annual report of the Director of the Mint, Washington, from 1898 to 1929. For 1930 figures are supplied by *Imperial Institute*.

† From the *Imperial Institute publications*.

Table 65.—World Production of Gold Ore, 1928-1930

(In terms of metal)
(Supplied by *Imperial Institute*)

Producing country	1928	1929	1930
	Fine ounces	Fine ounces	Fine ounces
BRITISH EMPIRE—			
United Kingdom.....	119	12	.....
Anglo-Egyptian Sudan (exports of bullion).....	5,845	2,515	1,000
Bechuanaland Protectorate (<i>b</i>).....	2,063	1,686	2,231
Gold Coast.....	157,815	(<i>b</i>) 217,806	(<i>b</i>) 246,075
Kenya.....	707	845	1,789
Nigeria.....	86	192	260
Northern Rhodesia.....	602	699	7,510
Southern Rhodesia.....	576,112	560,813	547,630
Sierra Leone (crude gold).....	.....	.....	895
South West Africa.....	541	435	222
Swaziland.....	347	90	.....
Tanganyika Territory.....	12,813	9,071	11,072
Union of South Africa.....	10,354,264	10,412,326	10,716,351
Canada.....	1,890,592	1,928,308	2,102,068
British Guiana.....	5,325	6,200	5,893
Federated Malay States.....	18,693	26,782	29,597
India.....	376,000	363,800	329,200
Sarawak (exports).....	.....	.....	.....
Australia.....	457,683	427,159	467,001
New Guinea (years ended June 30).....	60,000	44,000	30,000
New Zealand (<i>c</i>).....	114,481	112,542	129,070
Papua (years ended June 30).....	1,704	1,624	3,837
Total.....	14,000,000	14,100,000	14,600,000
FOREIGN COUNTRIES—			
Austria.....	.....	.....	.....
Czechoslovakia.....	8,381	9,354	9,418
France.....	54,076	57,709	100,019
Germany.....	5,432	5,823	6,067
Italy.....	2,299	3,409	2,942
Jugoslavia.....	14,100	18,500	23,000
Roumania.....	58,159	71,148	85,905
Russia.....	(<i>a</i>)	(<i>f</i>) 835,918	(<i>f</i>) 868,068
Sweden.....	28,935	35,011	33,790
Abyssinia.....	9,131	.....	(<i>a</i>)
Belgian Congo.....	138,631	172,832	210,245
Egypt.....	.....	.....	542
French West Africa.....	3,279	3,151	2,283
Madagascar.....	6,269	6,018	7,234
Mozambique.....	4,239	449	176
Mexico.....	699,102	651,873	668,977
United States.....	2,148,064	2,058,994	2,100,395
Costa Rica (<i>e</i>).....	12,852	4,052	4,780
Guatemala (<i>e</i>).....	9,852	9,445	14,307
Honduras.....	8,511	10,246	13,567
Nicaragua (<i>e</i>).....	11,249	12,102	13,323
Panama (<i>e</i>).....	1,024	2,598	121
Salvador (<i>e</i>).....	10	.....	.....
Argentina (estimated).....	1,000	1,000	1,000
Bolivia.....	506	665	(<i>a</i>)
Brazil (estimated).....	100,000	100,000	100,000
Chile.....	30,802	25,921	(<i>a</i>)
Colombia.....	66,883	76,657	(<i>a</i>)
Dutch Guiana (crude gold).....	5,483	3,560	4,000
Ecuador.....	74,600	70,000	70,000
French Guiana.....	45,428	48,932	43,917
Peru.....	70,504	122,141	71,084
Venezuela.....	46,107	46,477	58,729
China (estimated).....	100,000	100,000	100,000
Formosa.....	9,012	14,861	(<i>a</i>)
French Indo-China.....	257	514	370
Japan.....	334,053	335,078	387,983
Korea (estimated).....	180,000	160,000	180,000
Netherlands East Indies.....	110,255	109,702	110,448
Philippine Islands.....	92,109	160,620	179,216
Turkey.....	1,000	1,000	1,000
Total.....	5,300,000	5,300,000	5,600,000
World's Total.....	19,300,000	19,400,000	20,200,000

(*a*) Information not available.(*b*) Years ended March 31 following that stated.(*c*) Gold content of exports, excluding jewellers' sweepings.(*d*) Years ended September 30.(*e*) Imports into the United States.(*f*) Figures of Non-Ferrous Metals Trust, according to "Engineering and Mining World".

CHAPTER THREE

THE SILVER MINING INDUSTRY IN CANADA

Including the Silver-Cobalt Mining Industry, the Silver-Lead-Zinc Mining Industry, and Commodity Statistics Tables on Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review.
2. The Silver-Cobalt Mining Industry.
3. The Silver-Lead-Zinc Mining Industry.
4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review

(a) *Definition of the Industry.*—Silver mining is not a distinct industry in Canada, as silver is found, as an ore, only in association with those of other commercially valuable metals; with lead and zinc, as in many of the western mines; with the cobalt and nickel arsenides of northern Ontario, and in copper and other metalliferous ore deposits. Silver is nearly always found alloyed or associated with both alluvial and lode golds from which it is recovered in the refining of the crude gold bullion. This precious metal is, therefore, a rather common constituent in many of our mineral deposits, especially in those of the non-ferrous ores, and its value as a mine product is often a deciding factor in the economical working of an ore body. It is the paramount value in the rich native silver-cobalt ores of Ontario, while in the silver-lead-zinc industry it is usually recovered as an important by-product. The mining and smelting of argentiferous lead and zinc ores are very important industries, especially in British Columbia, and the silver recovered from this type of ore is a distinct contribution to the mineral production of Canada. It is therefore realized that the mining and metallurgy of silver bearing ores are closely interwoven with those of other important metals principally lead and zinc and in order to make a comprehensive survey of the Canadian silver production it is imperative to consider its various sources of origin.

(b) *Historical.*—History pertaining to early Canadian silver and lead mining is meagre. We find in Cape Breton, evidence of early colonial efforts to mine galena ores, and from the records of the French regime we find mention by Champlain of argentiferous galena on the east shore of Lake Temiskaming, this deposit being later worked under the name of the Wright mine. It is stated that early last century small shipments of galena ore were made to Europe from deposits on the east shore of Hudson's Bay. In Ontario, silver-bearing veins were found as early as 1846 in the vicinity of Thunder Bay on Lake Superior. It was not until 1866 that Thomas McFarlane discovered in this district high grade silver ore in important commercial quantities. This a sensational "find", was made on a small rocky island not more than 90 feet in diameter and located but a short distance off Thunder Cape. The property, later known as the Silver Islet mine, produced until 1884, the year of its abandonment, approximately \$3,250,000 in silver. Some of the other producing mines of this period in the Port Arthur district were the Silver Mountain, Beaver, Rabbit Mountain and Porcupine.

Construction of the Temiskaming and Northern Ontario railroad during 1903 was highly instrumental in the finding of one of the world's richest silver areas. Grading operations along what was then known as Long Lake in northern Ontario revealed veins possessing a mixture of unfamiliar minerals, leaves and wires of a white sectile metal were found on the surfaces of pinkish coated (erythrite) vein fillings. It was only after specimens of these "queer rocks" were sent south for identification and the announcement officially made of the discovery of important native silver and cobalt ores that the country became keenly interested. Silver discoveries and mine development in the South Lorraine and Gowganda areas followed shortly after the original finds at Cobalt and represent the results attained in the widened sphere of the prospecting activity subsequent to the first "boom" in Coleman township.

History is silent as to any important silver production or discoveries in the Prairie Provinces or Territories. Small amounts have been recorded as coming from either Manitoba or Alberta and chiefly represent the metal recovered in the refining of crude gold bullion. The dawn, or

perhaps more aptly put, the false dawn of the silver-lead mining industry in British Columbia reaches back into the early decades of placer prospecting. The gravel miners penetrating the unexplored upper waters of the auriferous streams eventually encountered widespread evidence of metalliferous deposits. Rich float found in the valley bottoms was often traced up the mountain sides to its source of origin and sometimes resulted in the discovery of potential mines. Early development and exploration was greatly delayed by lack of railroad facilities and it was not until late in the eighties that any appreciable production was registered. Small shipments aggregating \$37,925 were made in 1887 from various camps in the Kootenay district. It may be of interest, to note here, that the Monarch mine at Field, discovered in 1884, was a small shipper during 1887 and now after 45 years of intermittent operation has been reopened under sound financing and is again shipping silver-lead-zinc ores under modern and more efficient mining methods. Active operations in the Ainsworth camp date from about 1888 and those in the Sandon-Silverton areas from about 1892. The discoveries of the North Star, Saint-Eugene and famous Sullivan deposits were made in East Kootenay during 1892 and 1893.

A rather common and outstanding characteristic of these usually complex ores is the intimate intermixture of the different sulphides, the clean separation of which is an essential to efficient smelting. Early methods of hand-sorting and crude jigging were for the most part futile, penalties devoured the miners' profits and the hill sides were left with deserted workings. Intensive research and untiring effort have largely solved this perplexing problem through the introduction of selective flotation and, in the almost continuous expansion and improvement of the great smelting, ore dressing, and other works of the Consolidated Mining and Smelting Company at Trail, we read the history of an immense and successful Canadian industry. Gold was discovered in the Yukon river as early as 1869 and we find, in succeeding years, a synchronous silver production which originated in the alluvial recoveries of the former crude metal. These silver values mounted to impressive figures during the height of the Klondike placer operations. Some argentiferous lode discoveries were made in the Yukon during 1899, but there appears to have been little, if any, production therefrom until 1910, in which year an output of 37,418 ounces of vein silver was recorded. In July, 1919, L. Beauvet made the first outstanding discovery of valuable silver-lead ores in commercial quantities. This find occurred at Keno Hill 40 miles northwest of the town of Mayo. Ore shipments from these deposits commenced during the winter of 1920-1921. It was during the latter year that the rich Sadie-Friendship vein was found. All ores and concentrates from this area are shipped to outside plants for smelting. Cost of transportation has always been a very important factor in the economical working of these mines. In the early days of the camp horse haulage of the ore to Mayo was nearly half the cost of shipping from mine to smelter, however, in 1922-23 the Treadwell-Yukon Company introduced caterpillar tractors reducing this item by nearly two-thirds. It is interesting to note that the frost zone in the Mayo district extends, at some mines, to a depth of over 400 feet.

(c) *Sources of Silver, Lead, Zinc, Cobalt and Arsenic.*—Statistics on the production of silver from Canadian ores include (a) silver contained in silver and gold bullion produced, (b) silver contained in blister copper or lead bullion made, and (c) silver estimated as recoverable from ores of all kinds exported for treatment in foreign smelters.

Figures on lead for 1930 include lead contained in base bullion made at the Trail smelter, lead estimated as recoverable from silver-lead-zinc ores shipped from mines of the Yukon, and the pig lead made at Galetta in Ontario. Small quantities of lead contained in silver-lead-bismuth bullion recovered by the smelters treating cobalt ores are also included.

Most of Canada's zinc output is in the form of refined metal produced by the Consolidated Mining and Smelting Company at Trail, B.C., and the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba. The remainder represents zinc estimated as recoverable from ores, concentrates and residues exported for treatment in foreign smelters.

For the past two decades the ores of the Cobalt district of Ontario have been the main source of the world's supply of cobalt, but since 1926, owing to the production of cobalt by the Union Minière du Haut Katanga, from Central African copper-bearing ores, Canada's production was reduced to less than half of the world's output.

Arsenic is produced in Canada from the cobalt-silver-nickel-arsenic ores of the Cobalt district by the smelter of the Deloro Smelting and Refining Company Limited, at Deloro, Ontario. Some arsenic is also contained in the concentrates shipped to the Tacoma smelter by the Nickel Plate gold mine of British Columbia, however owing to the low price prevailing during the past few years this company has had little or no return for the arsenic.

(d) *Importance of these Metals.*—Among the metals and minerals produced in Canada during 1930, lead held fifth place, silver seventh, and zinc eighth in point of value. Canada ranked third in 1930 as a silver producing country, fourth in lead and a similar position in the smelter output of zinc. In the production of lead Canada was surpassed only by the United States, Mexico and Australia. It is interesting to note that in 1930 the Consolidated Mining and Smelting Company, Ltd., produced over 8 per cent of the world's lead production and 7.7 per cent of the zinc. The lead production of this company now exceeds the combined productions of Spain, Germany, Japan and Yugoslavia, and of the zinc producing countries, the United States, Belgium (from ore imports) and Poland are the only ones to exceed the zinc output of this single company. Canada and the Belgian Congo are the principal world producers of cobalt; the output of the latter country has recently surpassed that of the Dominion. From 1904 to 1910 the Canadian cobalt production figures represent an estimate of the cobalt content of the ores shipped from the mines; unfortunately during this period large quantities of the metal were wasted. From 1911 until the present time cobalt production is computed by adding the cobalt metal and the cobalt content of all cobalt oxides and salts, manufactured and sold by the Ontario smelters, to the cobalt paid for in ores and residues exported for treatment in foreign smelters.

Accurate figures for the world production of arsenic have proved rather difficult to obtain, the most authoritative data available are contained in table 81. Owing to prevailing low prices and the instability of demand, metallurgical plants remote from markets do not usually attempt the complete recovery of arsenic.

2. The Silver-Cobalt Mining Industry

Only mining and milling are considered in this chapter. Smelting of the cobalt ores, in so far as the Canadian operations are concerned, is treated in the chapter on "The Non-Ferrous Smelting and Refining Industry."

Following the production derived from Silver Islet and other properties of the Port Arthur district, comparatively little silver was produced in Ontario until the discovery in 1903 of the sensationally rich ores of the Cobalt area. From 1904, when the output of silver was over 3,000,000 ounces, the production increased rapidly until the peak was reached in 1910. In this year Ontario produced 30,366,366 ounces of silver, two years later production declined to 29,000,000 ounces and thereafter followed a generally downward trend until 1921 when less than 10,000,000 ounces were reported. Since 1921 the annual volume of production has fluctuated to some extent, however, the output for the past decade has remained fairly constant and in 1930 the provincial production amounted to 10,205,683 ounces. Silver recovered as a by-product in the treatment of gold and copper-nickel ores is of increasing importance in offsetting the decline in the recovery of this metal from arsenical-cobalt ores.

Ontario is the only province producing cobalt and refined arsenic. The ores of some of the older mines in the Cobalt area have either been exhausted or seriously depleted and it is only by the intensive and efficient exploration and mining of a comparatively few properties in Gowganda, South Lorraine and the Cobalt camp proper that silver production has remained fairly constant.

In 1930 there were 28 silver-cobalt properties where actual mining was conducted. In addition to these several shippers obtained ore from dumps and abandoned surface workings. Of the major operations, 3 were in South Lorraine, three in Gowganda and approximately six in the Cobalt area. The O'Brien mine was the largest producer from cobalt-silver ores; other mines in order of their production were Nipissing, Keeley, Miller Lake O'Brien, Mining Corporation, and Castle Tretheway.

The Nipissing Mining Company, Ltd., was the only company in the cobalt-silver group to produce silver bullion in 1930. Other mines in the Cobalt district shipped ore to the mill of the Cobalt Reduction Company, and to Deloro, Noranda, and foreign smelters.

During 1930 this group of mines produced 223,432 tons of ore; 202,565 tons were milled to yield 3,392 tons of concentrates; ore cyanided amounted to 40,406 tons and silver bullion production required 1,544,766 fine ounces. The total value of all shipments, including bullion, was \$3,637,181 as against \$3,918,316 in 1929.

Table 66.—Statistics of Silver-Cobalt Mine and Mill Operations in Canada, 1929 and 1930

	Unit of measure	1929	1930
Number of mines in operation.....		32	28
Ore mined.....	Tons	242,591	223,432
Ores treated.....	Tons	235,546	202,565
Tailings treated.....	Tons		4
Concentrates produced.....	Tons	3,996	3,392
Quantity of material cyanided.....	Tons	45,421	40,406
Bullion recovered.....	Fine ounces	1,546,165	1,544,766
Bullion recovered by direct smelting.....	Fine ounces		
Bullion sold.....	Fine ounces	1,367,063	1,821,643
Net value of bullion, ore, concentrates and residues sold.....	\$	3,918,316	3,637,181

Table 67.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
Capital employed as represented by—		
Cost of lands, buildings and equipment.....	10,537,310	6,799,087
Cost of supplies and stock on hand.....	262,569	417,551
Cash, trading and operating accounts and bills receivable.....	5,020,556	5,051,684
Total.....	15,820,435	12,268,322

Table 68.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1929 and 1930

	1929		1930	
	Number	Salaries and wages	Number	Salaries and wages
SALARIED EMPLOYEES—		\$		\$
Total.....	96	235,450	77	218,553
WAGE-EARNERS—				
Surface.....	297	1,296,883	230	1,270,038
Underground.....	648		598	
Mill.....	108		138	
Total.....	1,053	1,296,883	966	1,270,038
Total.....	1,149	1,532,333	1,043	1,488,591

Table 69.—Wage-Earners in the Silver-Cobalt Mining Industry in Canada by Months, 1929 and 1930

Month	1929				1930			
	Mine		Mill	Total	Mine		Mill	Total
	Surface	Underground			Surface	Underground		
January.....	269	660	110	1,039	211	597	139	947
February.....	261	636	110	1,007	199	593	139	931
March.....	245	599	109	953	196	579	135	910
April.....	238	594	107	939	206	593	134	933
May.....	277	597	108	982	215	563	120	898
June.....	271	592	106	969	208	560	130	898
July.....	274	637	107	1,018	243	557	133	933
August.....	280	636	108	1,024	272	592	123	987
September.....	292	633	105	1,030	245	609	113	967
October.....	293	638	107	1,038	244	581	114	939
November.....	294	660	108	1,062	243	595	117	955
December.....	290	602	109	1,001	247	584	110	941

3. The Silver-Lead-Zinc Mining Industry

CANADA

Silver-lead-zinc ores are widely distributed in Canada. Deposits containing these metals have been either investigated or developed in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, the Yukon, and the Northwest Territories. The mining and metallurgical treatment of this type of ore is largely confined to British Columbia where the growth of this particular branch of the mining industry is closely associated with the successful development and treatment of the Sullivan mine ores by the Consolidated Mining and Smelting Company of Canada.

QUEBEC

Silver-lead-zinc ores were mined from 1910 to 1929 at Notre Dame des Anges; during the latter year 29,798 tons of flotation concentrates were shipped from this property to foreign smelters. This mine, although not producing in 1930, carried on almost continuous underground development. Considerable exploratory work was conducted on an extensive system of lead-zinc veins in Lemieux township, Gaspé. The only zinc production in the province during the year was contained in smelter shipments of zinc concentrates by the Amulet mine. There was no production of lead in the province in 1930.

ONTARIO

Lead and zinc mineralization is fairly common in certain sections of Ontario. Several years ago lead ores were mined and smelted in Frontenac and Hastings counties. At present the greater part of the Ontario lead production comes from the Kingdon mine at Galetta. All of these deposits in eastern Ontario possess more or less common characteristics; veins are usually in or associated with crystalline limestones of the Grenville series and the vein matter generally consists of calcite, galena, and zinc blende. A distinctly different type of lead deposit is being developed at the Errington mine in the Sudbury field where ore deposition occurs in a major fault zone passing through slates and tuffs of pre-Cambrian age. The crushed zone is, in sections, several hundred feet wide; development indicates that the ore occurs in a number of separate and often parallel shoots. Ore consists of quartz, lead, zinc and copper sulphides, carbonate, rock inclusions and massive iron pyrites; the last mineral has been replaced, in part, by zinc blende, galena and copper pyrites. An average assay of ore from the Ollier stope in the Errington mine was 0.033 ounces gold, 2.08 ounces silver, 1.08 per cent copper, 1.20 per cent lead, and 6.4 per cent zinc. Mineral separation is by differential flotation and the concentrates in 1930 were shipped to foreign plants for metal recoveries.

MANITOBA

Silver production in Manitoba during 1930 amounted to 94,653 fine ounces valued at \$36,114. This was contained in blister copper made at the Flin Flon smelter and in crude gold bullion produced from auriferous quartz ores. Copper deposits were developed during the war and from 1918 to 1920 shipments of copper ore containing silver were made to Trail, B.C., in those three years output from this source amounted to about 50,000 ounces. Following this and owing largely to the drop in price of copper, combined with high freight rates, there were practically no shipments of copper ores for several years. In 1930 the Hudson Bay Mining and Smelting Company commenced the production of blister copper and refined zinc at their new metallurgical plants at Flin Flon.

BRITISH COLUMBIA

For some years, British Columbia has held first place among the silver, lead and zinc producing provinces of the Dominion. In this province, 45 per cent of Canada's silver, 97 per cent of the lead, and 93 per cent of the zinc were produced. The Sullivan mine, owned by the Consolidated Mining and Smelting Company, is considered to contain one of the largest known lead and zinc ore deposits in the world. It is the greatest Canadian producer of lead, zinc and silver. In 1897 and 1901 five million ounce silver productions were recorded for British Columbia, the metal coming largely from the silver-lead ores of the Kootenays. A recession to

less than two million ounces in 1911 was followed by an almost steady increase from that time until the present day. The 1930 outputs of lead, zinc and silver registered gains over those of 1929; these increases, were, however, considerably offset by the exceptionally low metal prices prevailing for the year.

Operations at the Premier, in the Portland canal section, were continuous; the Prosperity and Port Idaho, operated in this district by the same company, were brought into steady production with a persistent lowering of production costs throughout the year. In the Atlin division extensive mine development was carried out on the Atlin-Ruffener property and in the northwestern district new camps and a 100 ton pilot-concentrating mill were erected by the Consolidated Mining and Smelting Company at the Big Missouri Mine.

Located in the Golden mining division, the Monarch mine milled 70,000 tons of ore, largely from the northern and lower grade part of the ore-body, values averaged 1.3 ounces silver, 9.1 per cent lead, and 10.4 per cent zinc. Net recoveries were 94.4 per cent lead and 86.2 per cent zinc. Lead concentrates were smelted at the Selby smelter in San Francisco. Zinc concentrates were shipped to Japan and Europe. Owing to low metal prices the mill closed down on October 15; mine development was continued until the end of the year.

The metallurgical improvements and additions to the Trail smelter in 1930 included the completion and placing in operation in August of a new slag re-treatment plant, more familiarly called the zinc-fuming plant. A new lead furnace and a lead rolling mill were also installed.

On the northern end of Vancouver Island a new discovery consisting of silver-lead-zinc ores was optioned by the American Smelting and Refining Company. Prospecting, scouting and exploration for mineral properties proceeded steadily throughout the province and notwithstanding the general depression in metal prices it was reported that, in certain sections, more prospectors were in the hills than in recent years.

DISTRICT OF MACKENZIE

Deposits of lead ore situated about 32 miles southwest of Fort Resolution on Great Slave Lake were actively explored in 1929 by the Atlas Exploration Company. It is stated that the occurrences are of considerable economic importance and resemble to some extent those of the lead-zinc deposits in Missouri and other Mississippi valley states. Prospecting in this particular area during 1930 was considerably less than in the previous year.

YUKON

Mayo is the principal silver-lead producing district in the Yukon. In 1930, the Treadwell Yukon Company, the largest lode mining company in the Territory, conducted mining operations on the Sadie, Lucky Queen, Elsa, Mastiff and Silver King groups. During the summer months this company shipped 8,536 tons of concentrates containing 3,634,500 ounces of silver and 8,543,814 pounds of lead. Ore from three independent operators was shipped by the Treadwell Company. The air service of the Treadwell Yukon Company was maintained throughout the year without accidents of any kind and serviced four prospecting parties of two men each; nothing of consequence was found. It is planned by this company to maintain six or more prospecting parties in 1931.

Table 70.—Shipments of Lead Ores and Concentrates from Canadian Mines, 1921-1930

(For years 1913 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Shipment		Lead content in pounds	Silver content in ounces
	Tons	Value \$		
1921.....	15,259	671,313	9,517,616	989,374
1922.....	27,203	1,803,575	21,335,850	2,163,637
1923.....	76,886	4,692,755	66,770,926	3,745,129
1924.....	153,396	12,290,699	180,187,124	4,348,243
1925.....	208,588	15,420,756	237,675,311	6,024,213
1926.....	255,048	17,546,728	273,963,827	8,616,164
1927.....	275,328	13,044,514	308,903,620	8,831,840
1928.....	255,944	12,178,879	322,239,859	10,287,591
1929.....	258,203	15,990,117	328,877,236	10,177,925
1930*	259,630	11,024,912	336,976,074	10,172,485

* Shipments in 1930 contained 168,774 pounds of copper.

Table 71.—Shipments of Zinc Ores and Concentrates from Canadian Mines, 1921-1930

(For years 1898 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Shipments		Zinc content	Year	Shipments		Zinc content
	Tons	Value	Pounds		Tons	Value	Pounds
		\$				\$	
1921.....	297,406	1,498,716	98,799,092	1926.....	242,967	8,643,306	188,393,028
1922.....	356,096	2,357,849	102,975,964	1927.....	204,823	4,383,586	195,210,320
1923.....	279,229	1,853,114	96,148,734	1928.....	310,255	4,715,452	250,476,679
1924.....	191,369	4,310,271	129,643,631	1929.....	289,103	6,522,225	283,143,748
1925.....	173,172	6,481,930	153,980,628	1930.....	241,086	1,902,733	240,872,606

Table 72.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry, in Canada, 1929 and 1930

Production	*Quebec and Ontario	British Columbia	Yukon	Canada
1929	Tons	Tons	Tons	Tons
Ore mined.....	263,611	1,899,534	45,125	2,208,270
Ore milled.....	309,315	2,000,722	42,402	2,352,439
Concentrates produced—lead.....	9,189	210,031	5,942	225,162
Concentrates produced—zinc.....	29,338	242,479		271,817
Concentrates produced—copper.....	3,245			3,245
1930				
Ore mined.....	153,428	2,042,926	48,616	2,244,970
Ore milled.....	151,342	2,001,173	45,571	2,198,086
Concentrates produced—lead.....	2,455	226,939	4,210	233,604
Concentrates produced—zinc.....	6,092	235,852		241,944
Concentrates produced—copper.....	3,691			3,691

* In 1930 includes 14,000 tons of ore mined, 11,914 tons of ore milled and 2,519 tons of concentrates produced in Nova Scotia but not shipped.

Table 73.—Products Shipped by Silver-Lead-Zinc Mines in Canada, 1929 and 1930

Location of mines	No. of mines shipping	Products shipped	Quantity shipped	Net value at shipping point	Total metal content as determined by settlement assay				
					Gold	Silver	Lead	Zinc	Copper
1929			Tons	\$	Oz.	Oz.	Lb.	Lb.	Lb.
Quebec and Ontario.	3	Lead ore.....							
		Lead concentrates..	9,247	566,960	3,105	382,833	10,350,282		48,098
		Zinc concentrates..	31,127	806,556	1,590	140,976	371,840	30,150,566	
		Copper concentrates	3,277	130,534	857	39,599			996,781
		Total.....	43,651	1,504,050	5,552	563,408	10,722,122	30,150,566	1,044,879
British Columbia...	89	Lead ore.....	20,556	783,957	684	909,948	11,380,305	2,271,267	
		Lead concentrates..	220,546	12,385,385	1,296	5,546,894	298,146,118	24,353,427	1,023
		Zinc ore.....	2,752	50,002	22	22,512	303,584	1,403,502	
		Zinc concentrates..	255,224	5,665,667	97	592,413	18,109,563	251,589,680	
		Dry ore.....	19,008	105,213	117	252,051			
		Total.....	518,086	18,990,224	2,216	7,323,818	327,939,570	279,617,876	1,023
Yukon.....	9	Lead ore.....	2,687	659,595	45	1,028,668	2,843,660	18,805	14,086
		Lead concentrates..	5,167	1,594,220	170	2,309,583	6,156,871		97,940
		Dry ore.....							
		Total.....	7,854	2,253,815	215	3,338,251	9,000,531	18,805	112,026
Canada.....	101		569,591	22,748,089	7,983	11,225,477	347,662,223	309,787,247	1,157,928
1930									
Yukon and Ontario..	7	Lead ore.....	2,743	388,298	109	775,075	2,405,129		
		Lead concentrates..	8,153	1,540,793	573	3,049,585	9,092,184		101,137
		Zinc concentrates..	4,714	8,532				4,282,134	
		Copper concentrates.	3,445	71,908	610	36,902			999,424
		Total.....	19,055	2,009,531	1,292	3,861,562	11,497,313	4,282,134	1,100,561
British Columbia...	37	Lead ore.....	21,706	544,332	1,186	1,181,357	9,916,064	1,113,877	
		Lead concentrates..	227,028	8,551,489	3,411	5,166,468	315,562,697	21,720,825	67,637
		Zinc ore.....	561	12,250	4	29,210	148,263	245,901	1,023
		Zinc concentrates..	235,811	1,881,951	34	409,729	15,002,749	236,344,571	
		Dry ore.....	37	1,262	68	44			
		Total.....	485,143	10,991,284	4,703	6,786,808	340,629,773	259,425,174	68,660
Canada.....	44		504,198	13,000,815	5,995	10,648,370	352,127,086	263,707,308	1,169,221

Table 74.—Destination of Shipments from Silver-Lead-Zinc Mines in Canada, 1929 and 1930

Product shipped	Tons shipped	Net value at shipping point	Total metal content as determined by settlement assay				
			Gold	Silver	Lead	Zinc	Copper
		\$	Oz.	Oz.	Lb.	Lb.	Lb.
1929							
<i>To Canadian Smelters—</i>							
Lead ore.....	20,529	782,200	684	906,108	11,370,340	2,271,267	.....
Lead concentrates.....	222,226	12,506,654	518	5,503,611	301,462,774	24,353,427	1,023
Zinc ore.....	2,752	50,002	22	22,512	303,584	1,403,502	.....
Zinc concentrates.....	255,224	5,665,667	97	592,413	18,109,563	251,589,680	.....
Dry ore.....	19,008	105,213	117	252,051	.....	.....	.....
Total.....	519,739	19,109,736	1,438	7,276,695	331,246,261	279,617,876	1,023
<i>To Foreign Smelters—</i>							
Lead ore.....	2,714	661,352	45	1,032,508	2,853,625	18,805	14,086
Lead concentrates.....	12,734	2,039,911	4,053	2,735,699	13,190,497	.....	146,038
Zinc ore.....	.....	.....	.....	.....	.....	.....	.....
Zinc concentrates.....	31,127	806,556	1,590	140,976	371,840	30,150,566	.....
Dry ore.....	.....	.....	.....	.....	.....	.....	.....
Copper concentrates.....	3,277	130,534	857	39,599	.....	.....	996,781
Total.....	49,852	3,638,353	6,545	3,948,782	16,415,962	30,169,371	1,156,905
1930							
<i>To Canadian Smelters—</i>							
Lead ore.....	17,949	472,086	1,105	888,687	9,764,629	1,113,877	.....
Lead concentrates.....	219,972	8,310,013	3,411	5,104,002	304,573,617	21,720,825	67,637
Zinc ore.....	561	12,250	4	29,210	143,263	245,901	1,023
Zinc concentrates.....	224,806	1,828,533	34	409,729	15,002,749	223,214,713	.....
Dry ore.....	37	1,262	68	44	.....	.....	.....
Total.....	463,325	10,624,144	4,622	6,431,672	329,489,258	246,295,316	68,660
<i>To Foreign Smelters—</i>							
Lead ore.....	6,500	460,544	190	1,067,745	2,556,564	.....	.....
Lead concentrates.....	15,209	1,782,269	573	3,112,051	20,081,264	.....	101,137
Zinc ore.....	.....	.....	.....	.....	.....	.....	.....
Zinc concentrates*.....	15,719	61,950	.....	.....	.....	17,411,992	.....
Dry ore.....	.....	.....	.....	.....	.....	.....	.....
Copper concentrates.....	3,445	71,908	610	36,902	.....	.....	999,424
Total.....	40,873	2,376,671	1,373	4,216,698	22,637,828	17,411,992	1,100,561

* Does not include zinc concentrates produced from copper-gold-zinc ores in Manitoba or Quebec.

Table 75.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1929 and 1930

Province	Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
1929				
	\$	\$	\$	\$
Nova Scotia and Quebec.....	5,945,159	63,632	992,751	7,001,542
Ontario.....	6,692,029	187,106	276,069	7,155,204
British Columbia.....	30,537,808	1,454,444	850,661	32,842,913
Yukon.....	2,597,390	852,355	124,257	3,574,002
Canada.....	45,772,386	2,557,537	2,243,738	50,573,661
1930				
Nova Scotia and Quebec.....	4,559,026	91,101	82,744	4,732,871
Ontario.....	7,198,379	104,867	108,731	7,411,977
British Columbia.....	24,539,305	1,310,081	682,924	26,532,310
Yukon.....	2,596,907	657,407	122,202	3,376,516
Canada.....	38,893,617	2,163,456	996,601	42,053,674

Table 76.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1929 and 1930

Province	1929						1930					
	On salary	Mine		Mill	Total	Salaries and wages	On salary	Mine		Mill	Total	Salaries and wages
		Surface	Under-ground					Surface	Under-ground			
Nova Scotia and Quebec.....	27	123	139	21	310	\$ 336,959	17	123	94	19	253	\$ 262,476
Ontario.....	42	92	246	35	415	713,004	33	53	161	31	278	484,819
British Columbia.....	290	1,021	1,357	552	3,220	4,875,169	176	572	1,028	397	2,173	3,071,936
Yukon.....	12	100	84	12	208	557,260	12	62	76	12	162	444,730
Canada.....	371	1,336	1,826	620	4,153	6,482,392	238	810	1,359	459	2,866	4,263,961

Table 77.—Wage-Earners in the Silver-Lead-Zinc Mining Industry in Canada, by Months, 1929 and 1930

Month	1929				1930			
	Surface	Under-ground	Mill	Total	Surface	Under-ground	Mill	Total
January.....	870	1,588	481	2,939	863	1,539	453	2,855
February.....	898	1,511	491	2,900	821	1,393	434	2,648
March.....	935	1,572	506	3,013	684	1,135	404	2,223
April.....	1,002	1,512	495	3,009	646	1,055	415	2,116
May.....	1,158	1,612	550	3,320	658	1,067	444	2,169
June.....	1,307	1,725	602	3,634	716	1,073	437	2,226
July.....	1,375	1,720	645	3,740	648	1,093	419	2,160
August.....	1,352	1,693	647	3,692	578	1,036	404	2,018
September.....	1,328	1,652	597	3,577	561	1,025	385	1,971
October.....	1,235	1,715	625	3,575	534	994	388	1,916
November.....	1,033	1,711	582	3,326	437	870	345	1,652
December.....	932	1,580	510	3,022	418	800	304	1,522

4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc

ARSENIC

Arsenic bearing minerals or ores are rather widespread in Canada. Nova Scotia has, in the past, produced arsenic bearing concentrates in the milling of auriferous quartz ores; at the present time the Canadian production comes chiefly from the treatment of the cobalt-silver ores of northern Ontario. In British Columbia auriferous arsenical concentrates are exported by the Hedley Gold Mining Company for reduction in a Tacoma smelter. The greater part of the Canadian production of arsenic is recovered as a by-product by the Deloro Smelting and Refining Company, Deloro, Ontario.

Arsenic is utilized for various purposes; as an insecticide it is one of the principal constituents of Paris green and of lead and calcium arsenates; it is also employed as sodium arsenite for weed killing. Other uses include its adoption in the manufacture of certain glasses, cattle and sheep dips, paints, tanning supplies, wood preservatives and pharmaceutical preparations.

The United States and Mexico recover probably more than two-thirds of all the arsenic produced annually in the world and this, together with imports from other countries, is consumed in the United States.

Experimental dusting of forests with calcium arsenate to control destructive insects has been carried on by airplane in the Dominion.

Table 78.—Production of Arsenic in Canada, 1921-1930

(For production from 1885-1920, see Annual Report Mineral Production 1928)

Year	Arsenic in ore		White arsenic		Year	Arsenic in ore		White arsenic	
	tons	\$	tons	\$		tons	\$	tons	\$
1921.....			1,491	233,763	1926.....	545	12,687	1,992	134,124
1922.....	518	21,097	2,058	299,940	1927.....	667	15,644	2,447	196,335
1923.....	631	44,030	2,579	582,785	1928.....	708	16,539	2,008	176,513
1924.....	513	39,185	1,798	309,108	1929.....	766	17,314	1,849	154,006
1925.....	714	21,513	1,003	108,789	1930.....	1,011	34,523	1,250	95,004

Table 79.—Production, Exports and Imports of Arsenic, (As₂O₃), for Canada, 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
PRODUCTION—						
From arsenical concentrates exported.. lb.	1,416,805	16,539	1,531,218	17,314	1,773,540	19,599
White arsenic and arsenic in other forms lb.	4,015,418	176,513	3,698,870	154,006	2,750,680	109,928
Total lb.	5,432,223	193,052	5,230,088	171,320	4,524,220	129,527
EXPORTS—						
Arsenic, As ₂ O ₃ lb.	3,194,900	122,106	3,167,300	123,398	2,335,600	86,825
IMPORTS—						
White arsenic..... lb.	333,113	13,976	123,224	5,341	12,160	749
Sulphide of arsenic..... lb.	94,380	5,565	18,295	1,865	25,113	2,208
Arseniate of soda..... lb.	360	83	1,456	156	2,968	350
Arsenate of lead..... lb.	274,785	30,803	846,017	98,179	1,069,383	112,768

Table 80.—Monthly Average Prices of Arsenic, 1928-1930

(From Engineering and Mining World)

Month	In cents per pound		
	1928	1929 (a)	(a) 1930
January.....	4.00	4.5	4.5
February.....	4.00	4.5	4.5
March.....	4.00	4.5	4.5
April.....	4.00	4.5	4.5
May.....	4.00	4.5	4.5
June.....	4.00	4.5	4.5
July.....	4.00	4.5	4.5
August.....	4.00	4.5	4.5
September.....	4.00	4.5	4.5
October.....	4.00	4.5	4.5
November.....	4.00	4.5	4.5
December.....	4.00	4.5	4.5
Average.....	4.00	4.5	4.5

(a) The 1929 and 1930 prices are from "Canadian Chemistry and Metallurgy."

Table 81.—World Production of Arsenic 1928-1930

(Short tons)

(Supplied by Imperial Institute)

Country and Product	1928	1929	1930
BRITISH EMPIRE			
<i>United Kingdom—</i>			
Arsenical pyrites.....		22	
White arsenic and arsenic soot.....	1,448	1,067	648
<i>Southern Rhodesia—</i>			
White arsenic.....	112	57	55
<i>Union of South Africa—</i>			
White arsenic.....	19	37	17
<i>Canada—(Sales)—</i>			
Gold concentrates (As ₂ O ₃ content)	708	766	887
White arsenic.....	2,008	1,849	1,375
<i>Federated Malay States—</i>			
Arsenic.....	(a)	340	252
<i>Australia—</i>			
White arsenic.....	105	281	892

Table 81.—World Production of Arsenic, 1928-1930—Concluded

(Short tons)

(Supplied by *Imperial Institute*)

Country and Product	1928	1929	1930
FOREIGN COUNTRIES			
<i>Austria</i> — Gold ores (arsenic content).....			
<i>Czechoslovakia</i> — Arsenical pyrites.....	9	16	2
<i>France</i> — Ore (arsenic content)..... White arsenic.....	4,577 3,248	4,663 3,717	5,060 3,800
<i>Germany</i> — Ore (arsenic content).....	1,784	1,935	2,048
<i>Greece</i> — White arsenic.....	782	841	(a)
<i>Italy</i> — Ore (arsenic content).....			
<i>Jugoslavia</i> — Ore.....			8
<i>Portugal</i> — Ore..... White arsenic.....	148 (a)	138 (a)	(a) (a)
<i>Russia</i> (years ended Sept. 30th)— Ore.....	(a)	(a)	(a)
<i>Spain</i> — Arsenical pyrites (arsenic content).....			(a)
<i>Sweden</i> — Ore (arsenic content).....	5,011	5,053	4,795
<i>Algeria</i> — Arsenate of lead (arsenic content).....	336	840	389
<i>Mexico</i> — White arsenic, etc. (arsenic content).....	9,556	10,653	11,109
<i>United States</i> — White arsenic.....	14,164	16,605	17,056
<i>Brazil</i> — White arsenic.....	(a)	(a)	(a)
<i>Japan</i> — White arsenic.....	2,016	2,164	1,822
<i>Turkey</i> — Arsenic ore.....	11	16	62

(a) Information not available.

COBALT

Canadian cobalt production in 1930 includes the cobalt content of the various cobalt products sold by the Deloro Smelting and Refining Company, Deloro, Ontario, and the cobalt content of all ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Canada's production of cobalt which amounted to 694,163 pounds in 1930, decreased sharply from that of the preceding year. This was largely due to the adverse industrial conditions prevailing throughout the world during 1930. Competition from the Belgian Congo ores of the Union Minière du Haut Katanga has been increasing rapidly, the cobalt production of this company has now surpassed the Canadian output and in 1930 totalled 1,568,000 pounds.

Following the discovery of the cobalt camp in 1903, and until quite recently, the greater part of the world's supply of cobalt was derived from the treatment of ores mined in that area.

Two companies, the Coniagas Reduction Company of Thorold, Ontario (closed since 1926), and the Deloro Smelting and Refining Company, Limited, Deloro, Ontario, developed processes for the recovery of cobalt from these ores. (For a description of smelter practice see 1929 mineral production of Canada).

In 1922 the average price of \$3.25 per pound was used in computing the annual production value; \$2.85 was the price used for 1923 and from 1924 to date the values given in the report have been based on returns actually received by the operators. In 1930 the market quotations for cobalt were: metal, \$2.50 per pound; cobalt oxide, \$2.00 per pound.

A bounty of six cents a pound on the metallic content of cobalt and nickel oxides was paid by the Ontario government from 1907 to 1917.

The results of almost continuous research on cobalt during recent years are apparent in the many growing and diversified uses for this metal; its oxides are utilized as pigments in the manufacture of earthenware; cobalt salts are employed as driers in the paint and varnish industry, and the alloys exhibit a wide range of usefulness including their adoption as filaments in radio tubes, motor valves, abrasion resisters, steam turbine blades, cutting tools and various other applications, especially where stress resistance under extreme temperatures is a necessary factor.

It is interesting to observe that the cobalt ores of the Belgian Congo are now being smelted in Africa to form a cobalt-copper-iron alloy which is shipped to Belgium for further metallurgical treatment.

An historical summary of the cobalt production from 1904 is shown in the following table. For the years 1904 to 1910 inclusive the figures given were prepared by the Ontario Bureau of Mines and represent the estimated cobalt content of all ores shipped from the mines. From 1911 to date the quantities given are the cobalt content of all smelter products sold or shipped, such as cobalt metal, the oxides, mixed oxides, residues, etc.

Table 82.—Production of Cobalt from Canadian Ores, 1904-1930

Year	Pounds	Year	Pounds	Year	Pounds
1904.....	32,000	1913.....	865,937	1922.....	616,088
1905.....	236,000	1914.....	871,891	1923.....	760,105
		1915.....	504,212	1924.....	948,704
1906.....	642,000			1925.....	1,116,492
1907.....	1,478,000	1916.....	840,536		
1908.....	2,448,000	1917.....	1,079,572	1926.....	664,778
1909.....	3,066,000	1918.....	737,157	1927.....	880,590
1910.....	2,196,000	1919.....	530,371	1928.....	956,590
		1920.....	546,023	1929.....	929,415
1911.....	1,704,000			1930.....	694,163
1912.....	663,093	1921.....	251,986		
				Total.....	26,259,703

Table 83.—Production in Canada and Exports of Cobalt, 1928-1930

	1928		1929		1930	
	Pounds	\$	Pounds	\$	Pounds	\$
PRODUCTION— Cobalt, computed as cobalt in metal, oxides and salts sold, and in ores and residues exported.....	956,590	1,672,320	929,415	1,801,915	694,163	1,144,007
EXPORTS— Cobalt alloys, cobalt metallics, cobalt oxides, cobalt salts and cobalt ores.....		1,734,461		1,786,163		1,319,870

Table 84.—Imports of Cobalt into the United States, 1921-1930

(From *The Mineral Industry*, 1930)

Year	Ore		Cobalt		Zaffer		Oxide	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$		\$
1921.....	7,657	3,235	38,442	105,539			164,003	342,426
1922.....	5,195	7,075	126,364	321,396			217,530	435,895
1923.....	58,719	56,326	225,639	552,434			258,574	511,903
1924.....	28,786	37,276	118,952	264,935			226,703	440,898
1925.....	34,782	31,320	198,669	422,185			287,265	546,292
1926.....	154,468	55,820	387,076	820,873	110	40	333,132	632,478
1927.....	60,382	3,019	407,198	841,442			369,747	703,608
1928.....			(a)643,315	1,173,496			374,154	692,753
1929.....	434,443	51,862	806,640	1,743,465			475,928	884,873
1930.....	199,642	18,994	460,251	984,244			425,881	769,331

(a) Ore and metal.

Table 85.—World Production of Cobalt, 1928-1930

(Supplied by *Imperial Institute*)

Country	1928	1929	1930
	pounds	pounds	pounds
BRITISH EMPIRE			
Union of South Africa (ore).....		336	
Canada (c).....	956,592	929,415	694,163
India (b).....	224,000	246,400	(a)
Australia (metal).....	17,360	44,800	7,840
FOREIGN COUNTRIES			
Belgian Congo (metal and oxide).....	1,008,000	1,560,832	1,568,000
Chile.....	3,696		

NOTE.—Complex ores containing cobalt are also found in Germany and China, but cobalt content is not available.

(a) Information not available.

(b) Estimated cobalt content of nickel-speiss exported to Hamburg.

(c) Metal recovered from smelter products and including cobalt contained in cobalt residues exported.

SILVER

A small quantity of silver was recovered from crude gold bullion produced in Nova Scotia; in Quebec the silver output was less than in 1929 owing to the cessation of silver-lead mining, the 1930 production in this province came entirely from the metal recovered from auriferous quartz ores, Noranda blister copper, and copper concentrates shipped by the Consolidated Copper and Sulphur Company, Ltd.

Ontario produced 10,205,683 ounces, 80 per cent of which was in the form of bullion made from cobaltiferous ores; the balance was contained in concentrates exported, in gold bullion produced at gold mines, in nickel-copper and copper-lead-zinc ores mined in the Sudbury district and in gold, silver, and copper ores shipped to the Noranda smelter.

Manitoba's silver production came from gold bullion produced from auriferous quartz ores and from blister copper made at the Flin Flon smelter; the output for 1930 showed a substantial gain over that for 1929 owing to the commencement of copper smelting operations by the Hudson Bay Mining and Smelting Company, Ltd.

An output of 11,825,930 fine ounces of silver in British Columbia during 1930 established for the Province a new high production record for this metal. The principal silver producing mines were the Sullivan, Premier, Prosperity, Bell and Porter Idaho; small recoveries were made in the refining of bullion produced in alluvial and auriferous quartz mining. Silver contained in copper ores and concentrates exported to foreign smelters and in blister copper made at the Granby smelter contributed considerably to the total silver production.

The Yukon production of 3,746,326 fine ounces is an increase over 1929. Silver recovered as a by-product in alluvial gold operations was slightly less than the previous year and the total annual increase was realized through increased exports of silver-lead concentrates.

Producers of both silver-lead and cobalt-silver ores in Canada during 1930 suffered considerably through the almost unprecedented decline in the price of metals and in some instances it was only by efficient mining, low costs and the ability to recover and market the combined or some of the associated metals that continuity of mining operations was possible.

Suggestions have been advanced for an international conference to investigate the silver situation. It has also been advocated to re-establish silver on a monetary basis and to stimulate its use in the arts and industries.

Table 86.—Production of Silver in Canada, by Provinces and by Sources, 1929 and 1930

	1929		1930	
	Quantity	Value	Quantity	Value
	Fine ounces	\$	Fine ounces	\$
NOVA SCOTIA—				
In gold bullion.....	132	70	67	26
QUEBEC*—				
In gold ores, in blister copper and in copper ores and in silver-lead-zinc ores exported.....	813,821	431,269	571,164	217,922
ONTARIO—				
In silver bullion and nuggets.....	7,345,561	3,892,633	8,150,811	3,113,294
In gold bullion.....	256,786	136,079	294,135	112,224
In slags exported from gold mines.....	99	52	5,545	2,116
In matte, blister copper and in ores, concentrates and residues exported.....	1,288,280	682,698	1,746,192	666,242
Total.....	8,890,726	4,711,462	10,205,683	3,893,876
MANITOBA—				
†In gold bullion and blister copper.....	2,644	1,401	94,653	36,114
BRITISH COLUMBIA—				
In alluvial gold.....	1,160	615	1,612	615
In gold bullion.....	1,363	722	2,593	989
In blister copper.....	667,052	353,491	1,101,045	420,093
In base bullion and in ores exported.....	9,486,833	5,027,357	10,720,680	4,090,368
Total.....	10,156,408	5,382,185	11,825,930	4,512,065
YUKON—				
In alluvial gold.....	8,028	4,254	7,911	3,018
In ores exported.....	3,271,502	1,733,667	3,738,415	1,426,355
Total.....	3,279,530	1,737,921	3,746,326	1,429,373
Canada.....	23,143,261	12,264,398	26,443,823	10,089,376

* No silver-lead ores exported in 1930.

† In 1929 contains silver in gold bullion only.

Table 87.—Production of Silver in Canada, 1887-1930

Year	Fine ounces	Value	Cents per ounce	Year	Fine ounces	Value	Cents per ounce
		\$				\$	
1887.....	355,083	347,271	98-00	1909.....	27,529,473	14,178,504	51-50
1888.....	437,232	410,998	94-00	1910.....	32,869,264	17,580,455	53-49
1889.....	383,318	358,785	93-60	1911.....	32,559,044	17,355,272	53-30
1890.....	400,687	419,118	104-60	1912.....	31,955,560	19,440,165	60-83
1891.....	414,523	409,549	98-00	1913.....	31,845,803	19,040,924	59-79
1892.....	310,651	272,130	86-00	1914.....	28,449,821	15,593,631	54-81
1893.....	428,738	330,128	77-00	1915.....	26,625,960	13,228,842	49-68
1894.....	847,697	534,049	63-00	1916.....	25,450,741	16,717,121	65-66
1895.....	1,578,275	1,030,299	65-28	1917.....	22,221,274	18,091,895	81-417
1896.....	3,205,343	2,149,503	67-06	1918.....	21,333,979	20,693,704	96-772
1897.....	5,558,446	3,323,395	59-79	1919.....	16,020,657	17,802,474	111-122
1898.....	4,452,333	2,593,929	58-26	1920.....	13,330,357	13,450,330	100-900
1899.....	3,411,644	2,032,658	59-58	1921.....	13,543,198	8,485,355	62-654
1900.....	4,468,225	2,740,362	61-33	1922.....	18,626,439	12,576,758	67-521
1901.....	5,539,192	3,265,354	58-95	1923.....	18,601,744	12,067,509	64-873
1902.....	4,291,317	2,238,351	52-16	1924.....	19,736,323	13,180,113	66-781
1903.....	3,198,581	1,709,642	53-45	1925.....	20,728,998	13,971,150	69-065
1904.....	3,577,526	2,047,095	57-22	1926.....	22,371,924	13,894,531	62-107
1905.....	6,000,023	3,621,133	60-35	1927.....	22,736,698	12,816,677	56-370
1906.....	8,473,379	5,659,455	66-79	1928.....	21,936,407	12,731,725	58-176
1907.....	12,779,799	8,348,659	65-33	1929.....	23,143,261	12,264,308	52-993
1908.....	22,106,233	11,686,239	52-86	1930.....	26,443,823	10,089,376	38-154

Table 88.—Production of Silver from Canadian Ores,* by Provinces, 1921-1930

(For the years 1887 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		British Columbia		Yukon Territory	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
		\$		\$		\$		\$
1921.....	38,084	23,861	9,761,607	6,116,037	3,350,357	2,099,133	393,092	246,288
1922.....	.....	.....	10,811,903	7,300,305	7,150,937	4,823,384	663,493	447,997
1923.....	33,006	21,412	10,540,943	6,838,226	6,113,327	3,965,899	1,914,438	1,241,953
1924.....	83,814	55,972	11,272,567	7,527,933	8,153,003	5,444,657	226,755	151,429
1925.....	214,943	148,451	10,529,131	7,271,944	8,579,458	5,925,403	904,893	624,964
1926.....	375,986	233,513	9,274,965	5,760,402	10,625,816	6,599,376	2,095,027	1,301,159
1927.....	740,864	417,625	9,307,953	5,246,893	11,040,445	6,223,499	1,647,295	928,580
1928.....	908,959	528,796	7,242,601	4,213,456	10,943,367	6,366,413	2,839,633	1,651,985
1929.....	813,821	431,268	8,890,726	4,711,462	10,156,408	5,382,185	3,279,530	1,737,922
1930.....	571,164	217,922	10,205,683	3,893,876	11,825,930	4,512,065	3,746,326	1,429,373

*Does not include comparatively small productions from Nova Scotia, New Brunswick, Alberta and Manitoba, in 1930 the production in Manitoba amounted to 94,653 fine ounces valued at \$36,114.

Table 89.—Silver in Mine Shipments from Cobalt District and Nearby Camps in Ontario, 1904-1930

(From 1930 Report of Ontario Department of Mines.)

Year	Silver shipments in Troy ounces				
	Cobalt area	Casey township	South Lorrain	Gowganda	Others including Montreal River and Maple Mountain
1904.....	206,875	.....	.....	.....	.....
1905.....	2,451,356	.....	.....	.....	.....
1906.....	5,401,766	.....	.....	.....	.....
1907.....	10,023,311	.....	.....	.....	.....
1908.....	19,424,251	500	13,124	.....	.....
1909.....	25,658,683	26,185	194,955	.....	18,002
1910.....	29,849,981	92,544	221,133	471,688	9,835
1911.....	29,989,893	114,789	933,912	468,687	510
1912.....	28,605,940	253,824	834,119	549,976	.....
1913.....	28,105,505	825,108	248,992	502,370	.....
1914.....	24,155,699	499,643	108,199	399,300	.....
1915.....	24,280,366	223,939	.....	242,229	.....
1916.....	19,008,517	445,900	77,280	383,393	.....
1917.....	18,327,258	.....	10,000	1,064,635	.....
1918.....	16,807,407	143,901	72,188	638,198	.....
1919.....	10,314,689	171,278	4,586	723,764	.....
1920.....	10,402,249	.....	8,253	433,352	2,467*
1921.....	7,673,535	1,101	328,886	258,292	117
1922.....	9,239,147	1,028	1,284,307	170,651	15,994†
1923.....	7,259,858	.....	2,955,646	160,761	1,581
1924.....	6,704,787	.....	2,633,058	598,057	.....
1925.....	6,252,115	.....	3,099,964	1,355,156	.....
1926.....	6,262,249	.....	3,044,584	1,236,640	.....
1927.....	4,482,543	.....	2,319,356	1,741,614	.....
1928.....	3,934,020	.....	1,133,952	1,677,429	.....
1929.....	4,823,529	.....	876,006	2,081,894	.....
1930.....	5,329,335	.....	1,754,989	2,141,234	(a) 52
Total.....	364,974,864	2,799,740	22,157,489	17,299,320	48,558

* Includes 885 oz. from Silver Islet, Lake Superior.

† Silver Islet, exclusively.

(a) Nickel Hill Syndicate in the Sudbury area shipped a silver-cobalt ore.

Table 90.—Production of Silver in Manitoba, 1919-1930

Year	Fine ounces	Value
		\$
1919.....	20,700	23,069
1920.....	15,510	15,649
1921.....	33	20
1922.....	20	14
1923.....	5	3
1924.....	140	93
1925.....	477	329
1926.....	18	11
1927.....	12	7
1928.....	1,763	1,026
1929.....	2,644	1,401
1930.....	94,653	36,114

Table 91.—Production of Silver in British Columbia by Districts, 1929 and 1930

(From *Annual Report of the Minister of Mines for British Columbia.*)

District and division	1929		1930	
	Ounces	Value	Ounces	Value
		\$		\$
Northwestern District (No. 1)—				
Atlin.....				
Stikine.....				
Liard.....				
Nass River.....	285,394	154,239	256,205	97,752
Portland Canal.....	2,373,972	1,258,039	4,185,851	1,597,070
Skeena.....	328	174		
Queen Charlotte.....				
Bella Coola.....				
Northeastern District (No. 2)—				
Cariboo.....				
Quesnel.....				
Ömineca.....	273,691	145,037	71,342	27,220
Peace River.....				
Central District (No. 3)				
Nicola.....	41,945	22,228	73,743	28,136
Vernon.....				
Yale.....	1,038	550	116	44
Ashcroft.....				
Kamloops.....	356	189	5	2
Lillooet.....	670	355		
Clinton.....				
Southern District (No. 4)—				
Grand Forks.....			356,291	135,939
Greenwood.....	444,429	235,516	650,261	248,101
Osoyoos.....	226	120	203	77
Similkameen.....	167,040	88,520	115,941	44,236
Eastern District (No. 5)				
*Fort Steele.....	555,996	2,679,324	5,154,685	1,966,719
Windermere.....	2,663	1,411		
Golden.....	1,466	777	64,657	24,669
Ainsworth.....	92,323	48,925	3,310	1,263
Slocan.....	958,294	507,829	137,686	52,533
Slocan City.....	3,252	1,723	237	90
Nelson.....	26,868	14,238	10,418	3,975
Arrow Lake.....				
†Trail Creek.....	393	208	96	37
Revelstoke.....	466	247	1,153	440
Trout Lake.....				
Lardeau.....	529	280	609	232
Western District (No. 6)—				
Nanaimo.....	216	144		
Alberni.....	41	22		
Clayoquot.....			17	6
Quatsino.....				
Victoria.....				
New Westminster.....				
Vancouver.....	199,544	105,744	206,345	78,729
Total.....	9,931,140	5,262,809	11,289,171	4,307,270

* Includes some production from Sullivan mine in 1929.

† Production from slags and residues at Trail plant which cannot be credited to individual mines.

Table 92.—Imports into Canada and Exports of Silver, 1928-1930

	1928		1929		1930	
	Fine ounces	\$	Fine ounces	\$	Fine ounces	\$
IMPORTS—						
Silver in bars, blocks, ingots, drops, sheets or plates unmanufactured.....		984,547		958,312		610,634
Silver, manufactures of n.o.p. and articles consisting wholly or in part of sterling or other silverware.....		350,567		400,125		199,123
Silver coin.....						
Total.....		1,335,114		1,358,437		809,757
EXPORTS—						
Silver contained in ore, concentrates, etc.....	6,815,691	3,824,385	7,058,275	3,736,204	8,473,189	3,401,340
Silver bullion.....	14,805,993	8,579,968	14,879,770	8,022,917	15,778,755	6,180,412
Total.....	21,621,684	12,404,353	21,938,045	11,759,121	24,251,944	9,581,752
Silver coin—Foreign.....		2,561,535		2,603,704		2,417,822
“ “ Canadian.....				83		30

Table 93.—Monthly Average Prices of Silver, 1928-1930

(From the *Engineering and Mining World*)

Month	New York (Cents per fine ounce)			London (Pence per standard ounce)		
	1928	1929	1930	1928	1929	1930
January.....	57-135	57-019	45-000	26-313	26-257	20-896
February.....	57-016	56-210	43-193	26-205	25-904	20-008
March.....	57-245	56-346	41-654	26-329	26-000	19-298
April.....	57-395	55-668	42-428	26-409	25-738	19-554
May.....	60-298	54-125	40-736	27-654	25-084	18-850
June.....	60-019	52-415	34-595	27-459	24-258	16-049
July.....	59-215	52-510	34-346	27-262	24-289	15-928
August.....	58-880	52-579	35-192	27-096	24-288	16-283
September.....	57-536	51-042	36-315	26-440	23-708	16-738
October.....	58-087	49-913	35-846	26-727	23-042	16-563
November.....	57-953	49-615	35-908	26-704	22-690	16-625
December.....	57-335	48-475	32-635	26-362	22-258	15-201
Average.....	58-176	52-993	38-154	26-747	24-460	17-666

World Production.—In order of importance, the principal silver producing countries of the world are: Mexico, the United States, Canada and Peru. North America produced 181,873,935 ounces in 1930 as compared with 192,024,261 in the previous year; Europe, 10,953,700; Oceania, 9,800,000; Asia, 14,330,000, while Africa, the greatest gold producing continent, showed an output of only 1,288,395 fine ounces. The total world output for 1930 as computed by the American Bureau of Metal Statistics was 245,780,030 fine ounces as against 261,511,985 in 1929.

Table 94.—Comparative Figures of Silver Production, for the World, Mexico, United States, Peru and Canada, 1898-1930

Year	World's Output*	Mexico's Output*	United States Output*	Peru's Output*	Canada's Output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1898.....	165,295,572	56,738,000	54,438,000	1,951,240	4,452,333
1899.....	168,337,453	55,612,090	54,764,500	6,525,245	3,411,644
1900.....	173,591,364	57,437,808	57,647,000	7,295,825	4,468,225
1901.....	174,998,573	57,656,549	55,214,000	5,600,848	5,539,192
1902.....	162,763,483	60,176,604	55,500,000	4,264,528	4,291,317
1903.....	167,937,894	70,499,942	54,300,000	1,746,674	3,198,581
1904.....	168,390,238	60,808,978	57,682,800	3,008,705	3,577,526
1905.....	172,317,688	65,040,865	56,101,600	6,156,044	6,000,023
1906.....	165,054,497	55,225,268	56,517,900	7,404,238	8,473,379
1907.....	184,206,984	61,147,203	56,514,700	9,566,118	12,779,799
1908.....	203,236,861	73,664,027	52,440,800	9,566,118	22,106,233
1909.....	211,215,633	73,942,432	54,721,500	9,566,118	27,529,473
1910.....	221,715,673	71,372,194	57,137,900	6,626,930	32,869,264
1911.....	226,192,923	79,032,440	60,399,400	8,351,563	32,559,044

Table 94.—Comparative Figures of Silver Production for the World, Mexico, United States, Peru and Canada, 1898-1930—Concluded

Year	World's Output*	Mexico's Output*	United States Output*	Peru's Output*	Canada's Output
1912.....	224,310,654	74,640,300	63,766,800	8,351,563	31,955,560
1913.....	223,907,843	70,703,828	66,801,500	8,351,563	31,845,803
1914.....	160,669,129	27,546,752	72,455,100	9,214,190	28,449,821
1915.....	177,978,455	39,570,151	74,961,075	9,419,950	26,625,960
1916.....	156,626,521	22,838,385	74,414,802	9,419,950	25,459,741
1917.....	174,187,800	35,000,000	71,740,400	10,864,400	22,221,274
1918.....	198,168,408	62,517,000	67,810,100	9,781,734	21,383,579
1919.....	176,459,609	65,904,224	56,682,445	9,821,729	16,020,657
1920.....	174,212,686	66,662,253	55,361,573	9,196,282	13,330,357
1921.....	171,285,542	64,465,347	53,052,441	10,008,553	13,543,198
1922.....	209,815,448	81,076,899	56,212,054	13,169,765	18,626,439
1923.....	246,009,534	90,859,083	73,295,810	18,654,793	18,601,744
1924.....	239,484,703	91,486,136	65,366,840	18,717,087	19,736,323
1925.....	245,213,993	92,885,465	66,106,922	19,917,439	20,228,988
1926.....	253,795,166	98,291,166	62,672,953	21,499,798	22,371,924
1927.....	251,096,555	104,573,191	60,394,199	18,285,408	22,736,698
1928.....	257,925,154	108,537,307	58,426,004	21,607,693	21,936,407
1929.....	260,970,029	108,871,442	61,233,321	21,495,169	23,143,261
1930.....	250,000,000	105,204,059	50,627,243	14,372,593	26,443,823

*From Annual report of the "Director of the Mint", Washington.

†1930 figures from the *Imperial Institute*.

Table 95.—World Production of Silver Ore, 1928-1930

(In terms of metal)
(Supplied by *Imperial Institute*)
(Fine ounces)

Country	1928	1929	1930	Country	1928	1929	1930
BRITISH EMPIRE				FOREIGN COUNTRIES—			
United Kingdom.....	32,775	35,989	40,955	Con.			
Bechuanaland Protec-				Sweden.....	68,447	145,736	191,260
torate.....	157	148	434	Algeria.....	124,517	130,625	129,042
Gold Coast (estimated)	5,000	7,500	8,200	Morocco (French zone).....	58,000	52,000	64,000
Kenya.....	113	131	155	Mozambique.....	327	54	38
Nigeria (estimated).....	2,800	6,400	50,500	Tunis.....	220,742	99,000	90,000
Northern Rhodesia.....	88	2,249	637	Mexico.....	108,537,307	108,700,372	105,204,059
Southern Rhodesia.....	103,802	87,233	72,720	United States.....	57,872,443	60,860,011	50,627,243
South West Africa (b).....	728,000	892,000	1,003,000	Costa Rica (d).....	108,246	1,117	.....
Tanganyika Territory.....	1,562	1,027	1,278	Guatemala (d).....	281	.....	.....
Union of South Africa.....	1,031,376	1,031,779	1,050,038	Honduras.....	2,275,103	2,466,095	2,957,093
Canada.....	21,936,407	23,143,261	26,443,823	Nicaragua (d).....	21,360	43,298	38,103
British Guiana (estimated).....	700	820	780	Panama (d).....	2,261	301,365	.....
India.....	7,425,810	7,298,327	7,072,050	Salvador (d).....	875	.....	.....
Federated Malay States (estimated).....	1,650	2,360	2,600	Argentina (e).....	15,000	15,000	15,000
Australia.....	9,593,876	10,071,069	10,075,002	Bolivia (exports).....	5,638,756	6,214,531	(a)
New Zealand (c).....	444,486	415,706	565,860	Brazil (e).....	25,591	21,026	20,000
Papua (years ended 30th June).....	(a)	(a)	(a)	Chile.....	1,443,784	1,570,293	(a)
				Colombia.....	48,634	52,269	60,000
				Ecuador (e).....	79,804	96,511	106,127
				Guiana (French and Dutch) (e).....	7,000	7,000	7,000
Total.....	41,300,000	43,000,000	46,300,000	Peru.....	23,781,451	21,675,755	14,372,593
FOREIGN COUNTRIES				Venezuela (e).....	4,000	4,000	4,200
Austria.....	49,678	38,387	30,446	China (e).....	100,000	50,000	50,000
Czechoslovakia.....	1,103,003	1,302,274	1,469,004	Formosa.....	11,748	11,796	(a)
France.....	735,303	541,695	652,000	French Indo-China.....	9,131	3,167	(a)
Germany.....	5,220,839	5,512,664	5,485,433	Japan.....	5,144,763	5,163,434	5,628,306
Greece.....	262,530	171,130	(a)	Korea.....	56,082	54,724	68,756
Italy.....	766,282	598,717	506,301	Netherlands East Indies.....	2,031,967	1,991,127	2,094,261
Jugoslavia.....	61,100	80,000	77,000	Turkey (e).....	220,000	220,000	220,000
Norway.....	381,376	281,865	401,334	Philippine Islands.....	37,427	101,480	110,307
Poland.....	223,025	376,702	550,000	New Caledonia.....	(a)	(a)	(a)
Roumania.....	73,270	90,727	142,039				
Russia (years ended 30th Sept.).....	623,389	(a)	(a)	Total.....	220,000,000	222,000,000	200,000,000
Spain.....	2,526,443	2,659,223	2,819,169	World's Total..	261,000,000	265,000,000	250,000,000

(a) Information not available.

(b) Years ended March 31st of the year following that stated.

(c) Silver content of exports, including jewellers' sweepings.

(d) Imports into the United States from the country indicated.

(e) United States' Mint figures.

LEAD

CANADA

Canada's lead production includes (a) lead contained in ores and concentrates exported less deductions for smelter losses, valued at the average price in London for the year; (b) the lead contained in the base bullion made by the Consolidated Mining and Smelting Company, Ltd., at Trail, B.C., and the lead in a silver-lead-bismuth bullion produced at the Deloro smelter in Ontario, valued at the average price in London for the year, and (c) the pig lead made by the Kingdon Mining, Smelting and Manufacturing Company at Galetta, Ontario, at its sales value.

Production in 1930 included lead from the Kingdon and Errington mines in Ontario, from the Sullivan mine in East Kootenay, British Columbia, and from several other properties producing in the Slocan, Golden and Portland canal districts of the same province. Important quantities of lead were contained in silver-lead concentrates exported from the Yukon by the Treadwell-Yukon Mining Company.

Previous to 1904, lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces to a base bullion which was exported for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C., since 1904; this refinery treats the product from the Consolidated Mining and Smelting Company's blast furnaces.

A Canadian lead production of 332,894,163 pounds in 1930 represents nearly a two per cent increase in quantity over that for the previous year. The value, however, was much less owing to the exceptionally low prices for the metal.

Important quantities of lead are consumed in the storage battery, cable and pigments industries; the American Bureau of Metal Statistics show the use of lead in the United States in 1930 by percentages as follows: cable covering, 25.88 per cent; storage batteries, 21.63; white lead, 11.13; building, 8.89; ammunition, 4.42; red lead and litharge, 4.25, and the balance in solder, bearing metals, etc.

New fields are being found for the use of leadized pipe (lead-coated steel pipe). Antimonial lead is finding a new use in that burial caskets are being made entirely of this metal.

An outstanding feature of the lead and zinc pigment industry during the last few years has been the severe competition between white lead and other pigments for the paint trade. Sales in the United States of white lead in oil decreased from 153,000 tons in 1929 to 70,000 tons in 1930.

Table 96.—Production* of Lead from Canadian Ores, 1887-1930

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1887.....	204,800	9,216	1911.....	23,784,969	827,717
1888.....	674,500	29,812	1912.....	35,763,476	1,597,554
1889.....	165,100	6,488	1913.....	37,662,703	1,754,705
1890.....	105,000	4,704	1914.....	36,337,765	1,627,568
			1915.....	46,316,450	2,593,721
1891.....	88,665	3,857			
1892.....	808,420	33,064	1916.....	41,497,615	3,532,692
1893.....	2,135,023	79,636	1917.....	32,576,281	3,628,020
1894.....	5,703,222	187,636	1918.....	51,398,002	4,754,315
1895.....	16,461,794	531,716	1919.....	43,827,699	3,053,037
			1920.....	35,953,717	3,214,262
1896.....	24,199,977	721,159			
1897.....	39,018,219	1,396,853	1921.....	66,679,592	3,828,742
1898.....	31,915,319	1,206,399	1922.....	93,307,171	5,817,702
1899.....	21,862,436	977,250	1923.....	111,234,466	7,985,522
1900.....	63,169,821	2,760,521	1924.....	175,485,499	14,221,345
			1925.....	253,590,578	23,127,460
1901.....	51,900,958	2,249,387			
1902.....	22,956,381	934,095	1926.....	283,801,265	19,240,661
1903.....	18,139,283	768,562	1927.....	311,423,161	16,477,139
1904.....	37,531,244	1,617,221	1928.....	337,946,688	15,553,231
1905.....	56,864,915	2,676,632	1929.....	326,522,566	16,544,248
			1930.....	332,894,163	13,102,635
1906.....	54,608,217	3,089,187			
1907.....	47,738,703	2,542,086			
1908.....	43,195,733	1,814,221			
1909.....	45,857,424	1,692,139	Total.....	3,296,296,488	189,030,366
1910.....	32,987,508	1,216,249			

*Previous to 1913 the figures reported show the metal content of the shipments and are somewhat in excess of the actual amount recovered. Since 1912 the data given represent the quantity of lead produced in Canada from domestic ores, together with the estimated lead recovery from lead ores and concentrates exported.

Table 97.—Production of Lead from Canadian Ores, by Provinces, 1921-1930

(For years 1887 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		British Columbia		Yukon	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
1921.....	595,881	34,215	3,312,493	190,203	60,298,603	3,462,346	2,472,615	141,978
1922.....			2,890,397	180,216	87,093,266	5,430,265	3,323,508	207,221
1923.....	520,041	37,334	4,401,494	315,983	99,541,818	7,146,107	6,771,113	480,098
1924.....	1,058,983	85,820	5,055,368	409,687	168,467,628	13,652,617	903,520	73,221
1925.....	2,051,100	187,060	7,209,534	657,510	242,454,502	22,111,850	1,875,442	171,040
1926.....	3,729,636	251,788	7,398,795	550,730	266,812,461	18,012,509	5,860,373	395,634
1927.....	6,496,577	341,461	7,990,709	528,729	292,770,544	15,388,020	4,165,331	218,929
1928.....	6,218,336	281,520	6,814,757	402,289	317,722,146	14,537,377	7,191,449	329,045
1929.....	5,358,304	270,616	4,769,506	294,431	307,999,153	15,555,189	8,395,603	424,012
1930.....			2,193,856	116,034	321,803,725	12,637,232	8,896,582	349,369

Table 98.—Refined Lead Produced in Canada,* 1904-1930

Year	Pounds of refined lead produced	Year	Pounds of refined lead produced	Year	Pounds of refined lead produced
1904.....	7,519,440	1913.....	37,923,043	1922.....	81,412,716
1905.....	15,804,509	1914.....	36,443,706	1923.....	101,096,312
1906.....	20,471,314	1915.....	43,518,618	1924.....	130,471,203
1907.....	26,607,461	1916.....	33,087,474	1925.....	213,217,605
1908.....	36,549,274	1917.....	32,115,114	1926.....	257,273,585
1909.....	41,883,614	1918.....	31,571,112	1927.....	295,766,327
1910.....	32,987,508	1919.....	34,330,920	1928.....	301,067,819
1911.....	23,525,050	1920.....	28,720,030	1929.....	304,449,673
1912.....	35,893,190	1921.....	60,949,793	1930.....	304,471,706
				Total.....	2,569,128,121

* Includes the electrolytic lead produced from Canadian and foreign ores at Trail, B.C., and also the pig lead from Galletta, Ont.

Table 99.—Imports into Canada and Exports of Lead, 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
IMPORTS—						
Old and scrap, pig and block.....	531,404	31,141	1,173,481	68,787	764,305	32,029
Bars and sheets.....	161,970	10,742	260,862	16,437	1,521,359	95,793
Litharge.....	3,977,300	279,136	5,592,200	423,261	2,865,600	213,240
Acetate of lead not ground.....	36,096	3,624	110,275	10,206	172,387	16,496
Nitrate of lead not ground.....	225,672	17,758	305,321	22,246	150,904	10,066
Other manufactures, n.o.p.....		342,349		293,629		243,837
Pipe lead.....	184,754	13,648	59,874	5,138	369,082	23,067
Shots and bullets.....	11,158	1,408	13,434	1,474	9,043	907
Tea lead.....	34,650	3,022	13,480	1,350	17,920	1,430
Lead pigments—						
Dry white lead.....	289,001	21,761	67,585	6,297	47,287	4,099
White lead, ground in oil.....	492,497	39,211	236,093	19,538	58,662	5,894
Dry red lead and orange mineral....	1,469,943	100,733	1,791,872	134,685	1,352,076	110,075
Total.....	-	864,533	.....	1,003,048	.....	756,933
EXPORTS—						
Lead in ore.....	14,962,900	893,709	15,976,800	1,047,441	26,323,200	1,258,272
Pig lead.....	255,421,700	10,172,075	228,374,100	10,053,402	205,432,600	7,015,308
Total.....	270,384,600	11,065,784	244,350,900	11,100,843	231,755,800	8,273,580

Table 100.—Monthly Average Prices of Pig Lead, Montreal,* New York and London,† 1928-1930

Month	Montreal (Value in cents per pound)			New York (Value in cents per pound)			London† (Value in pounds sterling per long ton)		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
January.....	6.40	6.43	6.50	6.500	6.650	6.250	21.773	22.111	21.545
February.....	6.11	6.58	6.42	6.329	6.853	6.236	20.283	23.128	21.188
March.....	5.96	7.17	5.95	6.000	7.450	5.662	19.938	25.409	18.807
April.....	5.90	7.08	5.65	6.100	7.187	5.537	20.306	24.733	18.319
May.....	5.84	6.74	5.33	6.123	7.000	5.523	20.483	23.949	17.795
June.....	5.91	6.70	5.36	6.300	7.000	5.410	20.985	23.694	17.941
July.....	5.83	6.55	5.36	6.220	6.804	5.250	20.602	22.810	18.160
August.....	5.98	6.60	5.40	6.248	6.750	5.488	21.634	23.185	18.294
September.....	6.11	6.67	5.32	6.450	6.890	5.500	22.050	23.557	17.909
October.....	6.14	6.62	4.82	6.500	6.873	5.151	22.082	23.226	15.747
November.....	6.21	6.48	4.91	6.389	6.285	5.100	21.239	21.622	15.954
December.....	6.27	6.50	4.93	6.495	6.250	5.100	21.342	21.472	15.283
Average.....	6.06	6.67	5.49	6.305	6.833	5.517	21.060	23.246	18.077

*Producers' prices for car load quantities ex-cars Montreal, as furnished by the Consolidated Mining and Smelting Company.
†From the *Engineering and Mining World*.
‡ Computed at par \$4.8666, the London price of lead in 1928—4.575 cents per pound; in 1929—5.050 cents per pound; and in 1930—3.937 cents per pound.

CONSUMPTION OF LEAD IN CANADA, 1929 AND 1930

The apparent consumption of metallic lead in Canada during 1930 amounted to 60,285,000 pounds as compared with 75,257,000 pounds during 1929. These estimates were based on the following data:—Canadian smelter sales of refined or metallic lead in 1930 totalled 263,443,000 pounds; exports of pig lead, 205,432,600 pounds; imports of lead pigs and blocks, 753,544 pounds; imports of lead bars and sheets, 1,521,359 pounds. Smelter sales of refined or metallic lead in 1929 amounted to 302,204,000 pounds; exports of lead pig and blocks, 228,374,000 pounds; imports of pig, block, bars and sheets, 1,426,840 pounds. Census of Industry surveys conducted by the Bureau during 1929 give the metallic lead consumptions in the major Canadian lead consuming industries as: paints and pigments, 22,773,000 pounds; alloys (white metals) 16,707,000 pounds; iron and steel industries, 1,709,000 pounds; electrical industry, 29,867,000 pounds. In 1930 the consumption for these same industrial groups were recorded as follows: paints and pigments, 18,339,000 pounds; alloys (white metals), 18,279,000 pounds; iron and steel industries, 1,166,000 pounds; electrical industry, 25,499,000 pounds. The differences between the quantities of lead as shown under apparent consumption and amounts credited to the individual industries are to be accounted for either by annual (inventory) carry overs or assimilation of metal by consumers not included in the industrial groups in this survey.

Table 101.—World Production of Lead Ore, 1928-1930

(In terms of metal)
(Supplied by Imperial Institute)
(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	16,608	20,841	22,740
Kenya.....		2	
Nigeria.....	22	56	414
N. Rhodesia (smelter).....	5,237	1,831	
S. Rhodesia.....	59		4
S. W. Africa (b).....	29,456	28,560	31,920
Union of S. Africa.....	45	56	7
Canada.....	168,973	163,261	166,447
Newfoundland (estimated).....		12,320	13,440
India.....	113,792	114,352	128,128
Australia.....	200,854	217,287	221,306
Total.....	537,600	560,000	582,400

Table 101.—World Production of Lead Ore, 1928-1930—Continued

(In terms of metal)
(Supplied by *Imperial Institute*)
(Short tons)

COUNTRY	1928	1929	1930
FOREIGN COUNTRIES			
Austria.....	6,574	8,275	9,804
Bulgaria (estimated).....	3,584	4,032	1,344
Czechoslovakia.....	4,566	4,940	7,280
Finland.....	189	300	202
France.....	10,013	12,385	11,648
Germany.....	63,474	66,650	75,688
Greece.....	6,142	4,660	6,272
Italy.....	34,655	33,657	32,978
Jugoslavia.....	13,606	16,240	22,176
Norway.....		36	716
Poland.....	13,552	13,440	13,440
Portugal.....	336		
Roumania (smelter).....	592	623	1,085
Russia (estimated).....	2,912	6,832	12,320
Spain (smelters).....	144,348	157,358	135,875
Spitzbergen.....	78	54	(a)
Sweden.....	3,678	7,756	6,535
Algeria.....	8,656	9,914	8,512
Egypt.....		150	78
Morocco (French).....	4,144	3,926	4,592
Tunis.....	19,040	19,040	15,680
Mexico.....	260,681	273,815	256,762
United States.....	(c) 627,153	(c) 647,995	(c) 573,740
Argentina.....	2,072	3,416	(a)
Bolivia exports).....	14,006	16,492	(a)
Brazil (estimated).....	101	(a)	(a)
Chile.....	1,580	1,809	687
Peru.....	34,888	31,157	(a)
China (estimated).....	3,808	5,600	(a)
French Indo-China.....	276	57	22
Japan (smelter).....	4,026	3,720	3,947
Korea (smelter).....	780	361	140
Netherlands E. Indies.....			
Turkey (smelter).....	8,887	8,072	5,141
New Caledonia.....		155	500
Total.....	1,299,200	1,366,400	1,265,600
World's Total.....	1,836,800	1,926,400	1,848,009

(a) Information not available.

(b) Years ended March 31 of the year following that stated.

(c) Excluding Virginia, the production of which was in earlier years about 2,000 tons per annum.

Table 102.—World Metal Production of Lead, 1928-1930

(Supplied by *Imperial Institute*)
(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	9,522	11,948	11,445
Northern Rhodesia.....	5,237	1,831	
S. W. Africa (b).....	5,516	3,089	4,035
Canada.....	150,534	152,225	152,236
India.....	87,790	89,861	89,298
Australia.....	173,685	198,810	188,768
Total.....	432,320	458,080	445,760
FOREIGN COUNTRIES			
Austria.....	8,968	7,241	7,644
Belgium (c).....	95,086	91,326	94,105
Czechoslovakia.....	3,379	5,080	4,657
France.....	24,974	22,440	22,400
Germany (c).....	135,121	136,936	134,400
Greece.....	8,054	5,909	8,064
Italy.....	23,391	24,967	26,831
Jugoslavia.....	11,315	11,488	11,076
Norway (d).....	421	1,010	881
Poland.....	40,871	40,242	44,322
Portugal.....	92	104	(a)
Roumania.....	592		1,085
Russia (years ended Sept. 30).....	2,857	9,296	11,850
Spain.....	144,348	157,358	135,875
Sweden.....		71	8

Table 102.—World Metal Production of Lead, 1928-1930—Continued

(Supplied by Imperial Institute)

(Short tons)

COUNTRY	1928	1929	1930
FOREIGN COUNTRIES			
Egypt.....			
Tunis.....	19,407	21,429	21,392
Mexico.....	237,544	251,415	236,507
United States.....	669,329	715,667	614,361
Argentina.....	7,277	8,925	(a)
Peru.....	15,000	23,601	18,626
China (Exports).....	614	(a)	(a)
French Indo-China.....	11	19	12
Brazil (estimated).....		448	(a)
Japan.....	4,026	3,720	3,947
Korea.....	780	361	140
Turkey.....	8,887	8,073	5,141
Total.....	1,467,000	1,556,800	1,411,200
World's Total.....	1,994,000	2,016,000	1,859,200

(a) Information not available.

(b) Years ended March 31 of the year following that stated.

(c) Includes some secondary.

(d) Includes tin.

(e) Includes base bullion.

ZINC

Refined zinc is produced at Trail, B.C., from ores mined in British Columbia; in 1930 a new Canadian electrolytic zinc refinery was brought into production by the Hudson Bay Mining and Smelting Company, Ltd., at Flin Flon, Manitoba.

During 1930 zinc concentrates were produced at the Sterling mine, Richmond county Nova Scotia, by the British Metal Corporation, Ltd.; owing to adverse metal prices this property ceased to operate towards the end of the year. In Quebec the new 300 ton concentrator of the Amulet mine produced and shipped zinc concentrates for the first time; these went to Belgium plants for smelter treatment. The average value of ore treated during the period of operation was zinc, 13 per cent; copper, 3.5 per cent; silver, 3.5 oz. per ton; gold, 0.02 oz. per ton. The mill closed down in October following the fall in price of copper and zinc to the lowest level in years.

Zinc production in Ontario was represented by the metal contained in concentrates shipped from the Errington mine near Sudbury; Manitoba's output came from the ores of the Flin Flon mine, while in British Columbia some of the principal producing mines in the order of their output were the Sullivan, Monarch, Ruth Hope, Duthie, and Galena Farm.

Figures for the total Canadian production of zinc are compiled by adding the quantity of refined zinc made at Trail and Flin Flon to the amount of zinc estimated as recoverable from ores and concentrates exported; the value of production is calculated at the monthly average price for zinc on the London market for the year, exchange conversion being made at par. Previous to 1926, the average price on the St. Louis market was used, however, as the bulk of Canada's zinc output is exported and sold on the basis of London quotations it was thought that a more accurate aggregate value would be obtained by using prices quoted in London, and in 1926 this new practice came into vogue. It may be noted that the present procedure is in conformity with that of the British Columbia Department of Mines.

The total zinc production for Canada during 1930 amounted to 267,643,505 pounds. This output is 35.6 per cent greater than in 1929 and constitutes a new high record in Canadian zinc production; owing to the drastic reduction in price of zinc from 5.386 cents a pound in 1929 to 3.60 cents in 1930, the total value of zinc produced, valued at the average London quotation for 1930, was less than that of the previous year.

Metal recovery by slag-fuming was introduced at the Trail plant in 1930; blast furnace slag, containing approximately 16 per cent zinc and considerable lead is treated by a coal laden air blast, the combustion of which heats the slag and volatilizes the zinc and lead; the resulting oxides are recovered in a flue and bag house system.

According to the American Bureau of Metal Statistics, the consumption of zinc in the United States during 1930 for the manufacture of galvanized sheets, tubes, wire, wire cloth, pole line hardware, and other shapes, amounted to 217,000 tons; brass and castings, 145,000 tons; rolled zinc, 51,400 tons; die castings, 21,500 tons; lithopone, zinc dust and other products, 41,000 tons.

Table 103.—Production of Zinc from Canadian Ores, 1921-1930

(For years 1898 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Quantity	Value	Year	Quantity	Value
		\$			\$
1921.....	53,089,356	2,471,310	1926.....	149,938,105	11,110,413
1922.....	56,290,000	3,217,536	1927.....	165,495,525	10,250,793
1923.....	60,416,240	3,991,701	1928.....	184,647,374	10,143,050
1924.....	98,909,077	6,274,791	1929.....	197,267,087	10,626,778
1925.....	109,268,511	8,328,446	1930.....	267,643,505	9,635,166

Table 104.—Production of Zinc from Canadian Ores, by Provinces, 1921-1930

(For years 1898 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		Manitoba		British Columbia	
	Quantity	Value \$	Quantity	Value \$	Quantity	Value \$	Quantity	Value \$
1921.....							53,089,356	2,471,310
1922.....							56,290,000	3,217,536
1923.....	366,240	24,197					60,050,000	3,967,504
1924.....	2,909,008	184,547					96,000,069	6,090,244
1925.....	9,936,000	757,322	179,545	13,685			99,152,966	7,557,439
1926.....	12,904,176	956,199					137,033,929	10,154,214
1927.....	17,189,046	1,064,690					148,306,479	9,186,103
1928.....	21,057,760	1,156,745	58,724	3,226			163,530,890	8,983,079
1929.....	19,653,440	1,058,731	5,516,806	297,190			172,096,841	9,270,857
1930.....	9,754,160	351,150	3,527,894	127,004	3,882,141	139,757	250,479,310	9,017,255

Table 105.—Production of Refined Zinc in Canada, 1916-1930

Year	Short tons	Year	Short tons
1916.....	2,974	1924.....	27,444
1917.....	9,985	1925.....	38,462
1918.....	12,574		
1919.....	12,326	1926.....	61,727
1920.....	18,517	1927.....	73,208
		1928.....	81,765
1921.....	26,494	1929.....	86,048
1922.....	28,145	1930.....	121,496
1923.....	30,025		

Table 106.—Imports into Canada and Exports of Zinc and Brass, 1928-1930

	1928		1929		1930	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS		\$		\$		\$
Zinc and Zinc Products—						
Zinc in blocks, pigs, bars and rods and zinc plates, n.o.p.	3,546	394	3,212	280	2,588,853	124,128
Zinc in sheets and strips and zinc plates for marine boilers	9,295,469	686,899	10,628,131	787,152	6,024,973	410,467
Zinc, as spelter	1,845,258	107,920	2,658,483	165,566	1,860,276	90,270
Zinc white (80% Zn.)	18,128,357	1,166,491	19,052,472	1,248,668	14,575,729	885,580
Zinc dust	458,923	44,936	483,192	38,891	506,670	37,853
Zinc, sulphate and chloride of	2,530,141	98,501	3,123,840	125,742	2,685,186	96,242
Zinc, manufactures of	169,071	169,071		167,795		161,585
Lithopone	16,287,182	717,207	19,408,436	852,079	16,051,513	722,341
Total		2,991,389		3,386,173		2,528,464
Brass and Brass Products—						
Brass, in blocks, pigs and ingots	1,175,200	153,488	1,008,500	165,444	1,391,700	183,829
Brass, scrap	3,395,700	356,000	4,780,200	617,492	1,808,900	206,535
Brass, tubing not polished, bent or otherwise manufactured in lengths not less than 6 feet	3,322,210	748,869	4,074,669	1,020,931	3,628,084	766,872
Brass, plain wire	393,204	93,658	471,797	138,000	528,775	127,943
Brass, bars and rods	773,200	142,150	1,021,700	202,910	729,700	142,531
Brass, strips, sheets or plates	1,416,500	264,551	1,105,300	265,925	1,018,400	205,893
Brass, wire (loth, n.o.p.)		53,463		63,895		47,027
Brass, cups for manufacture of shells		157,274		173,609		119,831
Brass, caps for electric batteries		11,710		11,137		7,984
Brass, hand-pumps		28,511		31,287		14,627
Brass, nails, tacks, etc.		5,214		8,045		1,961
Brass and copper rivets, burrs and washers		87,659		227,652		73,984
Brass valves		401,824		571,551		440,883
Brass, other manufactures, n.o.p.		3,660,436		4,004,585		3,095,430
Carburetors of brass		35,015		43,790		12,536
Total		6,234,822		7,546,853		5,447,866
EXPORTS						
Zinc—In Ore	22,510,000	1,438,619	25,738,900	1,415,725	46,964,100	1,014,915
Ore						
Spelter	127,188,500	6,602,867	135,085,700	7,031,645	150,964,100	5,146,215
Scrap, dross and ashes	6,944,000	203,885	7,638,200	262,719	4,808,900	92,651
Total		8,245,370		8,710,089		6,253,781
Brass—						
Old and scrap dross and ashes	11,548,200	984,071	11,918,500	1,206,510	6,175,900	485,478
Rods, sheets and tubing	49,600	9,385	66,900	15,910	52,800	13,654
Valves		261,419		282,429		220,253
Mfrs. of brass, n.o.p.		591,159		892,850		741,352
Total		1,819,034		2,397,699		1,460,737

Table 107.—Monthly Average Prices of Zinc at Montreal, St. Louis and London, 1928-1930

Month	Montreal ¹ (In cents per pound)			St. Louis ² (In cents per pound)			London ² (In pounds Sterling per long ton)		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
January	7.10	7.29	5.950	5.6.3	6.350	5.229	26.125	26.196	19.634
February	7.00	7.30	5.825	5.551	6.350	5.180	25.518	26.247	19.209
March	7.08	7.37	5.550	5.624	6.463	4.934	25.082	27.050	18.304
April	7.21	7.23	5.340	5.759	6.658	4.843	25.493	26.759	17.819
May	7.39	7.05	5.070	6.026	6.618	4.641	26.102	26.727	16.639
June	7.35	7.00	4.990	6.158	6.686	4.441	25.664	26.216	16.422
July	7.23	6.94	4.920	6.201	6.766	4.350	24.946	25.332	16.171
August	7.15	6.85	4.880	6.249	6.800	4.360	24.540	24.896	15.953
September	6.97	6.74	4.830	6.250	6.799	4.270	24.497	24.208	15.773
October	6.91	6.50	4.480	6.250	6.740	4.050	24.030	22.927	14.446
November	6.99	6.15	4.600	6.263	6.242	4.266	24.801	20.851	14.706
December	7.30	6.00	4.570	6.349	5.666	4.099	26.609	20.103	13.762
Average	7.14	6.87	5.084	6.027	6.512	4.556	25.284	24.793	16.570

¹Supplied by Consolidated Mining and Smelting Co., Montreal, P.Q.²From the *Engineering and Mining World*.

Converted at par, the average London quotations in cents per pound: in 1928 were 5.493 cents, in 1929 were 5.387 cents, and in 1930 were 3.600 cents per pound.

CONSUMPTION OF ZINC IN CANADA, 1929 AND 1930

The apparent consumption of metallic zinc in Canada during 1930 amounted to 41,417,000 pounds as compared with 47,033,000 pounds in 1929. These estimates were based on the following data:—Canadian refinery sales of refined zinc in 1930 totalled 181,907,000 pounds; exports of refined zinc, 150,964,000 pounds; imports of spelter, 1,860,000 pounds; imports of blocks, sheets, etc., 8,613,826 pounds. Refinery sales of refined zinc in 1929 amounted to 168,829,000 pounds; exports of spelter totalled 135,085,700 pounds; imports of spelter, 2,658,483 pounds; imports of blocks, 3,212 pounds; imports of sheets, 10,628,131 pounds. Census of Industry surveys conducted by the Bureau during 1929 give the metallic zinc consumption in the major zinc consuming industries as: alloys (white metals), 1,632,000 pounds; iron and steel industry, 31,937,000 pounds; electrical industry, 2,878,000 pounds. In 1930 the zinc consumption for these same industrial groups were recorded as follows: alloys (white metal), 1,166,000 pounds; iron and steel industry, 25,136,000 pounds; electrical industry, 2,669,000 pounds. The differences between the quantities of zinc as shown under apparent consumption and amounts credited to the individual industries are to be accounted for either by annual (inventory) carry-overs or assimilation of metal by consumers not included in the industrial groups under review.

Table 108.—World Metal Production of Zinc, 1928-1930

(Supplied by Imperial Institute)
(Short tons)

Country	1928	1929	1930	Country	1928	1929	1930
BRITISH EMPIRE				FOREIGN COUNTRIES— Con.			
United Kingdom (b)....	62,042	65,294	54,430	Norway.....		6,080	38,152
Northern Rhodesia.....	10,749	13,576	20,056	Poland.....	178,316	186,322	192,201
Canada.....	81,764	86,048	121,496	Russia (years ended Sept. 30).....	2,488	4,816	5,126
Australia.....	56,250	58,097	61,489	Spain.....	14,935	13,036	11,791
Total.....	210,560	222,880	257,600	Sweden.....	5,665	5,261	4,636
FOREIGN COUNTRIES				Mexico.....	11,610	17,955	20,664
Belgium.....	227,407	218,147	194,261	United States.....	602,581	625,447	498,045
Czechoslovakia.....	8,861	11,767	14,850	China (exports).....	(a)	(a)	(a)
France.....	101,923	96,265	94,760	French Indo-China.....	3,179	4,198	4,250
Germany (b).....	115,416	116,101	112,000	Japan.....	21,073	24,360	27,194
Italy.....	11,744	17,420	21,235	Total.....	1,344,000	1,388,800	1,288,000
Jugoslavia.....	5,383	7,175	6,068	World's Total...	1,556,800	1,612,800	1,545,600
Netherlands.....	29,603	28,343	25,635				

(a) Information not available.

(b) Includes some secondary.

Table 109.—World Production of zinc ore (In terms of metal) 1928-1930

(Supplied by Imperial Institute)
(Short tons)

Country	1928	1929	1930	Country	1928	1929	1930
BRITISH EMPIRE				FOREIGN COUNTRIES— Con.			
United Kingdom.....	800	953	725	Russia.....	11,536	11,760	19,824
Nigeria.....	83		13	Spain.....	46,368	56,560	53,984
Northern Rhodesia.....	14,757	24,898	22,462	Sweden.....	15,622	32,991	33,040
Southern Rhodesia.....	181			Algeria.....	14,540	15,205	8,776
Canada.....	136,653	154,894	131,853	Egypt.....		647	336
Newfoundland (estimated).....		25,760	25,760	French Morocco.....	1,120	1,401	400
India.....	72,128	62,048	67,984	Tunis.....	4,032	4,134	896
Australia.....	165,607	173,109	133,967	Mexico.....	156,249	191,857	136,779
Total.....	389,760	441,280	383,040	United States.....	695,171	724,478	591,584
FOREIGN COUNTRIES				Bolivia (exports).....	2,492	1,538	(a)
Austria.....	3,479	4,365	3,921	Chile.....	550	43	(a)
Belgium (Ore).....	11,640	(a)	(a)	Peru.....	30,752	26,109	(a)
Czechoslovakia.....	582	9	708	China (estimated).....	4,480	12,320	4,144
Finland.....	759	898	496	French Indo-China.....	23,685	20,680	17,472
France.....	10,221	11,181	8,960	Korea (ore).....	5,855	5,620	(a)
Germany.....	159,159	157,043	152,839	Japan (estimated).....	11,200	11,200	11,200
Greece.....	4,934	6,512	1,456	Turkey (estimated).....	3,136	6,384	3,248
Italy.....	93,521	95,946	87,706	New Caledonia.....	1,120	342	1,000
Jugoslavia.....	381	190	5,040	Total.....	1,422,400	1,556,800	1,321,600
Norway.....	25	1,594	8,410	World's Total...	1,814,400	1,993,600	1,702,400
Poland.....	126,224	154,560	132,160				

(a) Information not available.

CHAPTER FOUR

THE NICKEL-COPPER INDUSTRY IN CANADA

Including Commodity Statistics Tables on Nickel, Copper, and Metals of the Platinum Group

1. General Review.
2. Commodity statistics including tables showing production by provinces, imports, exports, prices and world output of nickel, copper and metals of the platinum group.

1. GENERAL REVIEW

(a) *Definition of the Industry.*—The nickel-copper industry in Canada includes the mining, smelting and to a certain extent, the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., and Kristiansand, Norway. In addition to these shipments, a semi-finished material (washed nickel sulphides) of high nickel content, produced at Port Colborne, is exported for refining in Clydach, Wales.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 8 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production and trade statistics on nickel, copper and the metals of the platinum group are given in this chapter.

(b) *Historical.*—Construction of railways in Canada has resulted in the discovery of some valuable mineral deposits. One of these was the finding of the nickel-copper ores of the Sudbury area during the building of the Canadian Pacific Railroad in 1883. The first of these ore bodies was mined for copper in 1886 and it was not until 1887 that the presence of nickel was detected. Almost coincident with these discoveries occurred the introduction of nickel in the manufacture of special steels. This stimulated an almost continuous growth in the industry, a growth which has firmly established Canada as the premier nickel producing nation of the world.

For many years the principal use for nickel was in the manufacture of war material, especially in armour plate; this particular consumption of the metal reached its maximum during the late World War. Following the cessation of hostilities the demand for nickel was greatly reduced and it was largely by intensive research that new uses for the metal were developed and production re-established on a firmer and broader basis. The almost universal industrial expansion of the past decade was largely responsible for the high record production of 110,275,912 pounds of nickel from Canadian mines in 1929. Production of the metal declined sharply the following year and reflects the general and severe economic depression of 1930.

(c) *Importance of Nickel, Copper and Platinum Group Metals.*—Canada supplies about 90 per cent of the world's nickel requirements, the remainder being obtained largely from New Caledonia. A small amount of nickel is recovered from the silver-cobalt ores of the Cobalt district, most of the Canadian nickel output is, however, produced from the ores of the Sudbury area.

Copper produced from the nickel-copper ores in Ontario constitutes about 42 per cent of the total copper obtained from all Canadian ores. British Columbia mining and smelting copper and copper-gold ores, produces approximately 31 per cent of Canada's copper output. Quebec supplies 26.5 per cent and the Manitoba production accounts for the balance.

As a world producer of copper, Canada ranks fourth, contributing in 1930 about 8.5 per cent of the world's output. The amount of refined copper produced in Canada has been relatively small; heretofore, it has usually been found more profitable to ship blister copper or copper in matte or in concentrates to foreign metallurgical plants for conversion to refined metal. An increase in the Canadian demand for electrolytic copper may be expected as a phase of future industrial expansion and the output of refined copper from the New Canadian refineries should increase proportionately with the return of normal business conditions.

Some gold and silver, together with metals of the platinum group, including, in addition to platinum, the related metals, palladium, rhodium, osmium and iridium, are present in varying amounts in the different ores of the Sudbury district. The values of these metals in the different Sudbury deposits vary considerably and their recovery has been a factor of growing importance in the metallurgical treatment of the nickel ores.

At the present time, Canada produces about 18 per cent of the world's supply of platinum; recovery of most of this metal is carried out in refineries operating outside the confines of the Dominion.

Sales of nickel from the Port Colborne (Canada) and Clydach, (Wales) refineries of the International Nickel Company amounted to 56,934,612 pounds in 1930 as compared with 95,394,808 pounds in the previous year, a decrease of 40 per cent. Sales of products produced at the rolling mills in Birmingham, England, and Huntington, West Virginia, U.S.A., and the foundry in Bayonne, New Jersey, totalled 26,454,916 pounds as compared with 41,094,851 pounds in 1929, a decrease of 36 per cent. Copper sales, inclusive of copper in sulphate, increased from 81,833,776 pounds to 109,743,747 pounds or an increase of 34 per cent.

No changes were made in the International Nickel Company's price schedules for nickel in 1930. Copper declined in price from 18 cents to 9.5 cents, the lowest price recorded, except in 1894, for the past fifty years; consequently although more copper was sold in 1930 than in 1929 the profits were greatly reduced. Platinum metals and silver, important by-products from the company's electrolytic refining operations, sold at abnormally low prices during the year.

(d) *Mining*.—Total development at the Frood mine in 1930 amounted to 50,803 lineal feet or a distance of nearly ten miles. This mine can now supply 5,000 tons of ore daily; at the Levack mine, which was not in operation during 1930, the new fireproof head frame and sorting plant were completed. The first unit of the new International Nickel concentrator, with a capacity of 4,000 tons of ore per day, was operated during August and later milled 105,000 tons of ore per month; a second unit of like capacity was practically completed and was expected to be in operation on April 1, 1931.

Proven ore reserves of the International Nickel Company as of December 31, 1930, aggregated 206,704,000 tons. Recently proven ore below the 2,000 foot level of the Frood mine grades 4.93 per cent copper and 3.53 per cent nickel.

Breaking ore for production at the Falconbridge Mines, Ltd., commenced January 15, 1930, a total of 148,005 tons being broken of which 83,931 tons were hoisted; most of this was taken from above the 225 foot level. No stoping was done in November and December, 1930, owing to the smelter being closed down. From the 83,931 tons hoisted to the crushing plant, 11,904 tons of waste, or approximately 14 per cent, was eliminated by sorting. The remaining 72,027 tons averaged 2.47 per cent nickel and 1.08 per cent copper.

In British Columbia the B. C. Nickel Mines at the head of Emory Creek in the Yale mining division, continued exploration by electrical and diamond drilling methods of extensive nickel-bearing pyrrhotite deposits which occur in a wide basic dyke intrusive in granite. While a tonnage estimation of economic importance can be obtained only as a result of extensive underground development, the work accomplished is sufficient to indicate extensive bodies of nickel-bearing minerals which represent large reserves of the metal.

During 1930 a deposit of nickel-copper ore located at Ranken Inlet, west shore of Hudson Bay, was diamond drilled. The ore is associated with a sill of pyroxenite and consists of pyrrhotite with minor amounts of chalcopyrite and traces of pyrite; four holes cut commercial ore. It is estimated that the block from the drill holes to the surface contains 120,000 tons of possible ore, grading 1.22 per cent copper, 4.62 per cent nickel, and 0.11 ounces per ton of platinum.

(e) *Smelting and Refining*.—The metallurgy of the copper-nickel ores of the Sudbury district, which proved so troublesome when the district was first opened, has now been fairly well standardized and, in general, follows the practice of the other north American copper smelters up to the point of nickel separation.

Up to June, 1930, the practice of the International Nickel Company at Copper Cliff was briefly as follows: Coarse ore was first roasted in open heaps and then smelted in blast furnaces to produce a matte containing 25 per cent combined copper and nickel; fine ore was ground and roasted in multiple-hearth furnaces and smelted in a reverberatory to a matte containing 15 to 20 per cent copper and nickel. These two mattes were then blown in basic-lined Pierce-Smith converters to 78 to 80 per cent metal, the resulting matte was shipped to the refinery.

With the development of the Frood mine it was apparent that part, if not all, of this ore should be concentrated and it was therefore decided to introduce multiple-hearth roasting furnaces and reverberatory smelting.

The new smelter at Copper Cliff, consisting of 30 ten hearth Herreschoff roasting furnaces, 5 reverberatory furnaces and 8 Pierce-Smith type converters was brought into operation on July 1 and showed increased efficiency each successive month; a substantial saving in fuel alone justified the change in smelting practice from blast furnace to reverberatory. The concentrator and smelter handled 1,472,782 tons of ore and produced 106,194 tons of bessemer matte during 1930.

Coniston smelter owned by the same company produces a blast furnace matte which is blown to the white metal stage in Pierce-Smith converters. The resulting product which contains 79 per cent of copper plus nickel is shipped to the refinery. In 1930 this plant, with a new Dwight-Lloyd sintering plant in operation, smelted 812,345 tons of ore and produced 57,879 tons of bessemer matte.

The new smelter of the Falconbridge Nickel Mines, Ltd., blown in for the first time on February 4, 1930, consists of a blast furnace and two converters. The ore is smelted without previous roasting. This plant treated 71,626 tons of ore of an average grade of 2.47 per cent nickel and 1.08 per cent copper. Owing to smelter production exceeding the refinery capacity in Norway the smelter was shut down from October 31, 1930, to January 1, 1931. During the period of operation 2,630 tons of matte were produced and shipped to the Kristiansand refinery. This matte contained 1,514.75 short tons of nickel, 655.97 short tons of copper and an indeterminate amount of precious metals.

On October 1st the Port Colborne nickel refinery curtailed its output in conformity to a lessened demand for nickel. At this plant the platinum metals contained in Frood and Garson ores are recovered as by-products from the electrolytic refining of nickel and are shipped in the form of crude concentrates to the Acton plant in England for refining. During the year a semi-finished material of high nickel content was produced for export at Port Colborne; this replaces the bessemer matte formerly refined in Clydach, Wales. By this means copper is extracted and produced as electrolytic copper in Canada rather than as copper sulphate in Wales. A new research laboratory has been completed at Bayonne, New Jersey, by the International Nickel Company, this affords facilities for the present extensive research programme in connection with the development of new markets for nickel, nickel alloys and the platinum metals.

Nitre cake and sulphuric acid are now being regularly produced at the new Copper Cliff plant of the Canadian Industries, Ltd. This plant manufactures sulphuric acid from gases purchased from the International Nickel Company smelter.

The new electrolytic copper refinery of the Ontario Refining Company, Ltd., Copper Cliff, was successfully started in mid-year, later producing 6,000 tons of refined copper per month from blister copper made at the Granby smelter in British Columbia and the International Nickel Company's plants in Ontario. Gold and silver contained in Frood and Garson ores are recovered at this refinery.

Production of alloy steel is the most important outlet for nickel; a substantial portion of these steels is used in the construction of automobiles; owing to a radical curtailment in the

output of the automobile industry in 1930, sales of nickel to the steel industry were substantially less than in 1929. It is gratifying to note that the use of nickel steel in other fields was less adversely affected in 1930; some of the newer uses for nickel-steel actually registered increases during the year. The progress of corrosion-resistant nickel-chromium steels was very pronounced during 1930 and regardless of a general depression in the steel industry the production of these corrosion-resistant alloys exceeded that of 1929 by approximately 10 per cent.

Demand for satisfactory white metals for architectural and household use is increasing and is reflected in the continued growth of three types of nickel-bearing white metals, viz., "monel" metal, nickel-silver and nickel-chromium steels.

Metallic nickel contained in matte exported from New Caledonia in 1930 is reported at 5,500 tons; nickel production in countries other than Canada or New Caledonia would probably not exceed 2,000 tons.

Table 110.—Capital Employed in the Nickel-Copper Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
Capital employed as represented by—		
Cost of lands, buildings, plant, machinery and tools—		
Mines.....	16,698,121	22,793,333
Smelters and refinery.....	34,902,103	42,090,959
Cost of materials and supplies on hand.....	7,803,673	11,537,492
Cash, trading and operating accounts and bills receivable.....	4,129,182	6,014,901
Total.....	63,533,079	82,436,595

Table 111.—Output from Nickel-Copper Mines and Smelters in Canada, 1929 and 1930

		1929	1930
Ore mined.....	tons	1,991,910	2,127,043
Ore shipped.....	tons	1,991,910	2,115,139
Content of ores, etc., shipped:—			
Copper.....	lb.	103,457,449	142,948,534
Nickel.....	lb.	128,901,304	122,195,531
Ores and concentrates treated at smelters.....	tons	2,033,457	2,357,154
Matte produced.....	tons	132,030	166,703
Content of matte:—			
Copper.....	lb.	92,630,143	141,600,753
Nickel.....	lb.	116,190,232	122,224,692
Matte shipped to Canadian refineries.....	tons	115,599	137,364
Matte exported to Foreign smelters.....	tons	25,086	34,550

Table 112.—Proportion of Nickel and Copper in Sudbury Matte, 1912-1930

Year	Percentage		
	Nickel	Copper	Total
1912.....	53.5	26.3	79.8
1913.....	52.7	27.4	80.1
1914.....	49.0	31.1	80.1
1915.....	50.3	29.0	79.3
1916.....	51.6	28.0	79.6
1917.....	50.6	26.9	77.5
1918.....	52.6	26.0	78.6
1919.....	51.6	28.3	79.9
1920.....	52.7	27.6	80.3
1921.....	49.4	32.4	81.8
1922.....	50.1	31.3	81.4
1923.....	53.4	27.2	80.6
1924.....	52.6	27.9	80.5
1925.....	52.1	27.9	80.0
1926.....	49.6	30.6	80.2
1927.....	48.4	31.7	80.1
1928.....	47.6	32.6	80.2
1929.....	44.0	35.1	79.1
1930.....	36.6	42.5	79.1

Table 113.—Employees, Salaries and Wages, in the Nickel-Copper Industry in Canada, 1929 and 1930.

	1929				1930			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees—								
Mine and mill.....	46	1	47	151,655	42	1	43	178,211
Smelters and refinery.....	149	17	166	537,697	145	16	161	560,525
Total.....	195	18	213	689,352	187	17	204	738,736
Wage-earners—								
Mine and mill.....	3,172	.....	3,172	4,954,220	3,440	.....	3,440	5,210,572
Smelters and refinery.....	2,875	.....	2,875	4,473,625	3,077	.....	3,077	4,776,585
Total.....	6,047	.....	6,047	9,427,845	6,517	.....	6,517	9,987,157
Grand total.....	6,242	18	6,260	10,117,197	6,704	17	6,721	10,725,893

Table 114.—Employees by Months in the Nickel-Copper Industry in Canada, 1929 and 1930

Month	Mine		Mill	Smelters	Refinery	Total
	Surface	Under-ground				
1929						
January.....	454	1,748	173	1,406	1,079	4,860
February.....	470	1,800	190	1,452	1,123	5,035
March.....	526	1,800	199	1,471	1,134	5,130
April.....	642	1,916	215	1,484	1,187	5,444
May.....	683	1,990	214	1,491	1,281	5,659
June.....	706	2,173	225	1,549	1,393	6,046
July.....	728	2,232	232	1,607	1,466	6,265
August.....	753	2,429	243	1,568	1,473	6,466
September.....	777	2,556	242	1,623	1,392	6,590
October.....	794	2,711	239	1,681	1,419	6,844
November.....	816	3,010	248	1,779	1,380	7,233
December.....	806	2,906	219	1,771	1,301	7,003
1930						
January.....	708	2,996	198	1,866	1,352	7,120
February.....	731	3,146	199	1,848	1,376	7,300
March.....	731	3,214	197	1,829	1,397	7,368
April.....	731	3,019	204	1,779	1,356	7,089
May.....	713	3,065	217	1,801	1,385	7,181
June.....	612	2,555	165	1,836	1,364	6,532
July.....	537	2,526	165	1,907	1,399	6,534
August.....	590	2,531	182	1,777	1,386	6,466
September.....	595	2,575	167	1,941	1,339	6,617
October.....	528	2,537	158	2,025	962	6,210
November.....	418	1,911	124	1,515	903	4,871
December.....	404	1,753	122	1,693	883	4,855

NICKEL

Production figures include nickel in matte and speiss exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides and salts sold, valued in the aggregate at the sum obtained from the sales of oxides and salts.

Table 115.—Production of Nickel from Canadian Ores, 1921-1930

(For years 1889 to 1920 see 1928 report on the Mineral Production of Canada)

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
		\$			\$
1921.....	19,293,060	6,752,571	1926.....	65,714,294	14,374,163
1922.....	17,597,123	6,158,993	1927.....	66,798,717	15,262,171
1923.....	62,453,843	18,332,077	1928.....	96,755,578	22,318,907
1924.....	69,536,350	19,470,178	1929.....	110,275,912	27,115,461
1925.....	73,857,114	15,946,672	1930.....	103,768,957	24,455,133

Table 116.—Production in Canada, Imports and Exports of Nickel 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
PRODUCTION—						
Nickel in matte and speiss exported*.....	37,783,991	6,801,118	28,172,633	5,071,074	41,959,927	7,552,574
Refined and electrolytic nickel produced....	49,144,875	12,596,371	70,704,762	18,639,814	57,478,651	15,485,381
Nickel in oxides and salts sold.....	9,826,712	2,921,418	11,398,517	3,404,573	4,330,279	1,417,178
Total.....	96,755,578	22,318,907	110,275,912	27,115,461	103,768,857	24,455,133
IMPORTS—						
Nickel, nickel silver and German silver, in ingots or blocks, n.o.p.....	217,112	79,001	31,006	8,492	37,462	9,250
Nickel in bars and rods, strips, sheets and plates.....	730,106	240,378	1,243,865	388,296	1,120,122	347,461
Nickel silver and German silver, in bars, rods, strips, sheets, plates or anodes.....	168,494	57,191	258,445	94,827	180,122	69,664
Nickel chromium, in bars and rods.....	50,990	52,738	71,938	72,790	44,344	44,434
German, Nevada and nickel silver, manufactures of, not plated.....		382,730		606,236		471,036
Nickel-plated household hollow-ware.....		85,138		94,796		18,401
Nickel kitchenware.....		2,451,421		3,224,828		2,004,598
Nickel-plated ware, n.o.p.....						
Total nickel and its products.....		3,348,597		4,490,265		2,966,905
EXPORTS—						
Nickel, fine.....	51,183,700	13,320,034	68,408,200	17,544,513	43,122,500	11,262,512
Nickel contained in matte.....	36,371,800	5,457,222	29,630,700	4,501,389	44,890,400	8,142,794
Nickel in oxide.....	9,607,200	3,004,951	11,600,900	3,489,782	3,733,000	1,100,018
Total.....	97,166,700	21,782,207	109,639,800	25,535,684	91,745,900	20,505,324

*Nickel in matte and speiss exported valued at 18 cents per pound.

Table 117.—World Production of Nickel Ore, 1926-1930

(In terms of metal)

(Supplied by the Imperial Institute)

(Short tons)

Country	1926	1927	1928	1929	1930
British Empire—					
Canada.....	32,860	33,399	48,378	55,138	51,884
India (b).....	(a)	284	814	930	952
Australia.....		96		95	132
Foreign countries—					
Greece.....	30	28	726	(a)	(a)
Norway.....		179	451	483	965
United States (c).....	306	860	522	343	308
New Caledonia (d).....	4,220	3,543	2,063	4,592	5,376
World's Total.....	37,416	38,389	52,954	61,600	59,360

(a) Information not available.

(b) Nickel metal in speiss obtained as a by-product in smelting operations.

(c) Nickel content of salts and nickel produced as a by-product in the electrolytic refining of copper.

(d) Nickel content of exports.

COPPER

CANADA

Copper production includes copper contained in ores and concentrates exported, copper in blister copper made, in matte exported and in copper sulphate made during the year.

Refined copper was produced commercially in quantity for the first time in Canada in 1916 at the Trail refinery of the Consolidated Mining and Smelting Company. The British America Nickel Corporation which produced refined copper at the Deschenes refinery for the first time in 1920, went into liquidation during July, 1924.

The production of electrolytic copper in the form of wire bars, small ingots, ingot bars, cathodes and V.C. cakes, commenced in 1930 at the new copper refinery in Copper Cliff, Ontario. This refinery treated blister copper made by the International Nickel Company of Canada and the Granby smelter at Anyox, British Columbia.

Construction on the new copper refinery a subsidiary of Noranda Mines, Ltd., being erected at Montreal East was practically completed and production at this plant is expected early in 1931.

Copper prices in 1930 suffered a severe decline from the exceptionally high average price of 18 cents in 1929. In October, 1930, the metal broke to 9.597 cents, the lowest price recorded in over thirty-five years, the average for the year was 12.982 cents (New York).

Table 118.—Production of Copper from Canadian Ores, 1886-1930

Year	Pounds	Value	Cents per pound	Year	Pounds	Value	Cents per pound
		\$				\$	
1886.....	3,505,000	385,550	11.00	1909.....	52,493,863	6,814,754	12.982
1887.....	3,260,424	366,798	11.25	1910.....	55,692,369	7,094,094	12.738
1888.....	5,562,864	927,107	16.66	1911.....	55,648,011	6,886,998	12.376
1889.....	6,809,752	936,341	13.75	1912.....	77,832,127	12,718,548	16.341
1890.....	6,013,671	947,153	15.75	1913.....	76,976,925	11,753,606	15.269
1891.....	9,529,401	1,226,703	12.87	1914.....	75,735,960	10,301,606	13.602
1892.....	7,087,275	818,580	11.55	1915.....	100,785,150	17,410,635	17.275
1893.....	8,109,856	871,809	10.75	1916.....	117,150,028	31,867,150	27.202
1894.....	7,708,789	736,960	9.56	1917.....	109,227,332	29,687,989	27.180
1895.....	7,771,639	836,228	10.76	1918.....	118,769,434	29,250,536	24.628
1896.....	9,393,012	1,021,960	10.88	1919.....	75,053,581	14,028,265	18.691
1897.....	13,300,802	1,501,660	11.29	1920.....	81,600,691	14,244,217	17.456
1898.....	17,747,136	2,134,980	12.03	1921.....	47,620,820	5,953,555	12.502
1899.....	15,078,475	2,655,319	17.61	1922.....	42,879,818	5,738,177	13.382
1900.....	18,937,138	3,065,922	16.19	1923.....	86,881,537	12,529,186	14.421
1901.....	37,827,019	6,096,581	16.117	1924.....	104,457,447	13,604,538	13.024
1902.....	38,804,259	4,511,383	11.626	1925.....	111,450,518	15,649,882	14.042
1903.....	42,684,454	5,649,487	13.235	1926.....	133,094,942	17,490,300	*
1904.....	41,383,722	5,306,635	12.823	1927.....	140,147,440	17,195,487	*
1905.....	48,092,753	7,497,660	15.590	1928.....	202,606,046	28,598,249	*
1906.....	55,609,888	10,720,474	19.278	1929.....	248,120,760	43,415,251	*
1907.....	56,979,205	11,398,120	20.004	1930.....	303,478,356	37,948,359	*
1908.....	63,702,873	8,413,876	13.208	Total.....	2,942,692,562	468,208,668	*

*Since 1926 the value of Canada's copper production was computed according to the note on page 291.

Table 119.—Production of Copper in Canada, by Provinces and by Sources, 1929 and 1930

Production	1929		1930	
	Pounds	Value	Pounds	Value
By PROVINCES—		\$		\$
Quebec.....	55,337,169	10,019,901	80,310,363	10,425,891
Ontario.....	88,879,853	14,622,572	127,718,871	15,187,259
Manitoba.....			2,087,609	215,018
British Columbia.....	103,903,738	18,772,778	93,318,885	12,114,657
Yukon.....			42,628	5,534
Total.....	248,120,760	43,415,251	303,478,356	37,948,359
By SOURCES—				
In blister copper produced.....	160,190,580	28,059,843	223,890,467	27,965,905
In copper sulphate produced.....	154,357	27,950	183,575	23,831
In ores exported.....	69,555,356	12,594,388	67,694,448	8,787,636
In nickel-copper matte exported.....	18,220,467	2,733,070	11,709,866	1,170,987
Total.....	248,120,760	43,415,251	303,478,356	37,948,359

Table 120.—Production of Refined Copper in Canada, 1916-1930

Year	Tons	Year	Tons
1916.....	483	1924.....	1,768
1917.....	3,901	1925.....	170
1918.....	3,809	1926.....	10,581
1919.....	3,467	1927.....	9,191
1920.....	2,590	1928.....	8,806
1921.....	2,143	1929.....	3,518
1922.....	365	1930.....	31,377
1923.....	824		

Table 121.—Production of Copper Sulphate in Canada, 1921-1930

Year	Pounds	Year	Pounds
1921.....	643,910	1926.....	404,862
1922.....	230,835	1927.....	566,825
1923.....	307,135	1928.....	771,400
1924.....	127,301	1929.....	617,430
1925.....	121,746	1930.....	734,300

The Consolidated Mining and Smelting Co. Ltd. of Trail, B.C., is the only company producing copper sulphate in Canada, the output being used by them in their own plant. Formerly the Coniagas Reduction Company at Thorold, Ontario, was also a producer.

QUEBEC

Copper production from the province of Quebec in 1930 included the estimated recovery of copper contained in concentrates shipped by the Consolidated Copper and Sulphur Company, Ltd., and the copper in blister made at the Noranda smelter from Quebec ores.

ONTARIO

Statistics of copper production in Ontario for 1930 included the copper contained in converter copper made by the International Nickel Company, Ltd., at the Port Colborne, refinery; the copper in nickel-copper matte exported by this company and the Falconbridge Nickel Mines, Ltd.; the recoverable copper in concentrates exported by silver-cobalt and copper-lead-zinc mines and the copper in ores shipped to the Noranda smelter.

The bounty offered by the Ontario government on copper 95 per cent pure and on copper sulphate produced from ore mined and refined in the province was never gained and the Act, known as the Metal Refining Bounty Act, warranting the bounty, which expired April 10, 1917, was not re-enacted.

MANITOBA

In December, 1930, the recently completed smelter of the Hudson Bay Mining and Smelting Company commenced production of blister copper from the sulphide ores of the Flin Flon mine. This blister copper, the first to be produced in Manitoba, was shipped to the United States for refining.

BRITISH COLUMBIA

A production of 93,318,885 pounds of copper in British Columbia was considerably less than that of the previous year; the greater part of the year's output consisted of the metal contained in blister copper made at the Anyox smelter of the Granby Consolidated Mining, Smelting and Power Company, and in copper concentrates shipped to United States smelters from the Britannia and Copper Mountain mines. Considerable copper is contained in a matte produced from lead ores treated at the Trail smelter; this is exported to the United States for refining. A comparatively small amount of copper is also contained in exports of ore from a few of the smaller mines.

It is interesting to note that the annual report for 1930 of the British South Africa Company gives proven ore reserves in Northern Rhodesia as 449,000,000 tons averaging 4.0 per cent copper and the tonnage of copper contained in the known ore reserves of the Union Minière du Haut-Katanga in the Belgian Congo is reported by that company as being 5,000,000 tons as on December 31, 1930.

Table 122.—Quantity and Value of Copper Produced in Canada, by Provinces, 1919-1930

(For production in previous years see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Manitoba		British Columbia		Yukon	
	lb.	\$	lb.	\$	lb.	\$	lb.	\$	lb.	\$
1919.....	2,691,695	503,105	24,346,623	4,550,627	3,348,000	625,775	44,502,079	8,317,884	165,184	30,874
1920.....	880,638	153,724	32,059,993	5,596,392	3,062,577	534,604	45,319,771	7,911,019	277,712	48,478
1921.....	352,308	44,045	12,821,385	1,602,930	.....	.....	34,447,127	4,306,580	.....	.....
1922.....	.....	.....	10,943,636	1,464,477	.....	.....	31,936,182	4,273,700	.....	.....
1923.....	.....	.....	31,656,800	4,565,227	.....	.....	55,224,737	7,963,959	.....	.....
1924.....	1,893,008	246,546	37,113,193	4,833,622	.....	.....	65,451,246	8,524,370	.....	.....
1925.....	2,510,141	352,474	39,718,777	5,577,311	.....	.....	69,221,600	9,720,097	.....	.....
1926.....	2,674,058	368,886	41,312,867	4,828,964	.....	.....	89,108,017	12,292,450	.....	.....
1927.....	3,119,848	403,084	45,341,295	4,946,533	.....	.....	91,686,297	11,845,870	.....	.....
1928.....	33,697,949	4,909,791	66,607,510	8,770,149	.....	.....	102,283,210	14,902,664	107,377	15,645
1929.....	55,337,169	10,019,901	88,879,853	14,622,572	.....	.....	103,903,738	18,772,778	.....	.....
1930.....	80,310,363	10,425,891	127,718,871	15,187,259	2,087,609	215,018	93,318,885	12,114,657	42,628	5,534

* Includes small quantities produced in 1925, 1926 and 1927 but not reported until 1928.

Table 123.—Imports into Canada and Exports of Copper, 1928-1930

	1928		1929		1930	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Copper in bars or rods, when imported by manufacturers of trolley, telegraph and telephone wires, electric wires and electric cables for use only in the manufacture of such articles in their own factories also in 1930 copper bars for use only in the manufacture of rods to be used exclusively in the manufacture of electrical conductors and copper rods for such manufacture, the individual units of such electrical conductors not exceeding the area of No. 7-0 gauge conductor.....	36,063,400	5,537,148	54,824,600	9,922,096	30,906,700	4,368,678
Copper in bars or rods, in coil or otherwise, in lengths of not less than 6 feet, unmanufactured.....	539,300	102,740	719,200	164,642	1,595,900	305,381
Copper in blocks, pigs or ingots.....	7,883,600	1,176,941	12,084,000	2,246,600	7,867,200	1,022,936
Copper, old and scrap.....	5,606,300	785,141	4,958,300	827,832	1,443,700	173,114
Copper, ore and concentrates.....	100	52	.....	.....	.....	.....
Copper, in strips, sheets or plates not polished or coated.....	2,586,700	521,559	2,806,300	698,974	1,844,700	410,565
Copper tubing in lengths of not less than 6 feet, and not polished, bent or otherwise manufactured.....	2,549,901	602,730	2,662,706	721,369	1,895,872	442,842
Copper wire, plain, tinned or plated.....	827,059	217,735	937,858	267,464	722,729	178,299
Copper wire cloth, or woven wire of copper.....	.....	14,128	.....	9,613	.....	9,509
Copper wire, single or several, covered with cotton, linen, silk, rubber or other material, including cable so covered.....	.....	677,923	.....	809,729	.....	557,027
Copper, all other, manufactures of, n.o.p.....	.....	1,074,156	.....	1,313,811	.....	768,393
Copper, precipitate, of, crude.....	3,825	102	.....	.....	.....	.....
Anodes of nickel, zinc, copper, silver or gold.....	.....	15,853	.....	16,127	.....	9,745
Copper, sub-acetate of, or verdigris, dry.....	410	94	681	177	7,528	1,323
Copper, sulphate of (blue vitriol).....	3,741,971	190,515	3,054,964	162,491	5,085,027	224,067
Copper, sulphate of, dehydrated, for agricultural or spraying purposes.....	1,627,074	84,130	1,315,462	74,202	931,552	49,775
Copper rollers adapted for use in calico printing.....	.....	21,003	.....	37,664	.....	81,406
Total.....		11,021,950		17,272,791		8,603,060
EXPORTS—						
Copper, fine, contained in ore, matte regulus, etc.....	76,427,900	7,023,884	86,999,100	8,944,965	74,804,600	7,236,456
Copper, blister.....	104,764,700	15,375,344	148,278,500	26,711,867	147,521,400	22,428,176
Copper, old and scrap.....	8,061,700	869,839	11,559,600	1,574,712	6,765,600	740,099
Copper in bars, rods, strips, sheets, plates and tubing.....	158,200	40,988	132,100	35,900	6,959,200	827,944
Copper wire and cable insulated.....	.....	259,430	.....	119,030	.....	111,678
Copper mfrs., n.o.p.....	.....	25,930	.....	13,522	.....	10,191
Total.....		23,595,415		37,399,996		31,354,544

Table 124.—Monthly Average Prices of Copper (Electrolytic), New York and London, 1928-1930

(From the *Engineering and Mining World*)

	New York (In cents per pound)			London (£ Sterling per long ton)		
	1928	1929	1930	1928	1929	1930
January.....	13-854	16-603	17-775	66-575	78-602	83-250
February.....	13-823	17-727	17-775	66-381	83-538	83-500
March.....	13-845	21-257	17-775	66-443	98-356	83-405
April.....	13-986	19-500	15-621	66-500	89-405	74-338
May.....	14-203	17-775	12-756	67-216	83-727	59-545
June.....	14-527	17-775	12-049	68-738	84-013	56-750
July.....	14-527	17-775	11-023	68-670	84-043	52-522
August.....	14-526	17-775	10-693	68-750	84-250	50-725
September.....	14-724	17-775	10-310	69-800	84-363	49-500
October.....	15-202	17-775	9-597	71-935	83-978	45-772
November.....	15-778	17-775	10-113	74-750	82-202	48-963
December.....	15-844	17-775	10-300	75-000	82-569	50-065
Average.....	14-570	18-107	12-982	69-230	84-921	61-523

Table 125.—World Production of Copper Ore, 1928-1930

(In terms of metal)

(Supplied by Imperial Institute)

(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	76	76	54
N. Rhodesia (smelter).....	6,642	6,122	7,021
S. Rhodesia (smelter).....	122	349	1,471
South West Africa (b).....	12,432	13,888	16,688
Union of South Africa.....	9,701	9,937	9,510
Canada.....	101,348	124,060	151,739
Cyprus.....	5,488	6,496	5,712
India (estimated).....	6,272	8,400	13,552
Australia.....	10,602	14,349	14,542
Total.....	152,320	183,680	220,640
FOREIGN COUNTRIES			
Austria.....	3,345	2,294	2,443
Bulgaria (ore).....	12,029	34,580	30,257
Czechoslovakia.....	1,791	1,499	2,578
Finland.....	2,102	5,191	5,657
France.....	292	657	459
Germany.....	28,895	31,948	29,732
Italy.....	906	973	551
Jugoslavia (estimated).....	14,560	22,400	25,760
Norway.....	19,597	20,987	20,164
Portugal (estimated).....	2,240	4,480	4,480
Roumania (smelter).....	114	158	187
Russia (estimated).....	22,288	29,120	40,320
Spain.....	59,360	70,560	69,440
Sweden.....	682	1,243	889
Algeria.....	253	28	(a)
Belgian Congo (smelter).....	123,962	151,007	153,164
French Equatorial Africa.....	440	204	336
Morocco (French).....	.....	83	.....
Cuba.....	18,869	16,486	17,920
Mexico.....	72,208	95,409	80,922
United States.....	904,898	997,555	697,200
Bolivia (exports).....	9,354	7,923	5,824
Chile.....	316,141	353,434	266,292
Peru.....	62,233	61,855	52,416
Formosa (ore).....	67,747	109,450	(a)
Japan (smelter).....	75,214	83,190	87,119
Korea (smelter).....	660	594	640
Turkey (black copper).....	15	72	.....
Total.....	1,736,000	1,960,000	1,568,000
World's Total.....	1,892,800	2,150,400	1,792,000

(a) Information not available.

(b) Years ended March 31 of the year following that stated.

Table 126.—World Metal Production of Copper, 1928-1930

(Supplied by Imperial Institute)
(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom (estimated).....	23,632	26,096	22,288
Northern Rhodesia.....	6,642	6,122	7,021
Southern Rhodesia.....	122	349	1,471
Canada (d).....	62,412	80,096	111,945
India.....	13,281	1,831	3,331
Australia.....		12,179	16,688
Total	106,400	126,560	162,400
FOREIGN COUNTRIES			
Austria.....	3,773	4,294	4,493
Belgium.....	10,714	9,855	16,138
Czechoslovakia.....	1,113	1,865	1,677
Finland.....	413	259	(a)
France (b).....	1,378	1,534	2,800
Germany.....	53,424	59,024	65,296
Italy.....	992	594	289
Jugoslavia.....	16,630	23,503	26,966
Norway.....	868	2,688	5,676
Roumania.....	114	158	187
Russia (years ended 30th Sept.).....	20,940	33,600	52,304
Spain.....	30,597	31,472	29,827
Sweden.....	4,001	5,429	6,381
Belgian Congo.....	123,962	151,007	153,164
Mexico.....	48,860	71,785	62,169
United States.....	1,004,702	1,100,977	857,007
Chile.....	302,319	333,460	217,739
Peru.....	57,642	59,482	50,336
China (exports).....	4,845	3,825	1,326
Formosa.....	460	287	(a)
Japan.....	75,214	83,190	87,119
Korea.....	660	594	640
Total	1,758,400	1,982,400	1,635,200
World's Total	1,870,400	2,105,600	1,792,000

(a) Information not available.

(b) Includes some matte.

(c) Includes some secondary.

(d) Copper content of blister copper.

CONSUMPTION OF REFINED COPPER IN CANADA, 1929 AND 1930

The apparent Canadian consumption of copper as contained in domestic copper refinery products and in imports not further processed than strips, sheets, tubing and plain wire, totalled 67,736,000 pounds in 1930 as compared with 80,804,000 pounds during 1929. These estimates were based on the following data:—

IMPORTS OF COPPER INTO CANADA, 1929 AND 1930

	1929	1930
	lb.	lb.
Copper in bars and rods.....	55,500,000	32,503,000
Copper in strips, sheets, plates, etc.....	2,800,000	1,845,000
Copper in pig and block.....	12,000,000	7,867,000
Copper tubing.....	2,600,000	1,896,000
Copper wire, plain, tinned or plated.....	1,000,000	723,000
Total	73,900,000	44,831,000

EXPORTS

Copper in bars, rods, strips, sheets, plates and tubing.....	132,100	6,959,200
--	---------	-----------

CANADIAN REFINERY SALES

	lb.
1929.....	7,036,000
1930.....	29,861,000

Copper manufactures (other than those listed above) bronze, brass, and scrap, have not been considered in the compilation of the present figures.

Consumption of copper, chiefly in the form of rods, by the Canadian electrical industry, in 1930 amounted to 63,000,000 pounds as compared with 75,000,000 pounds in 1929. The iron and steel industry in Canada during 1930 absorbed approximately 7,000,000 pounds of copper in all forms as against 6,000,000 pounds in 1929.

METALS OF THE PLATINUM GROUP

Metals of the platinum group produced from Canadian sources include platinum, palladium, rhodium, iridium, etc., these are recovered in the refining of nickel-copper matte from the Sudbury district; a minor amount of stream platinum is yielded by British Columbia placers and platinum and palladium are obtained in small quantities from the ores treated in the metallurgical plants of the Consolidated Mining and Smelting Company at Trail, British Columbia.

Production of the platinum group metals in Canada comes almost entirely from the copper-nickel sulphide ores of the Sudbury area. The International Nickel Company Limited is now operating a very complete and modern precious metal refinery at Acton, England; in this plant concentrates containing metals of the platinum group, produced at Port Colborne, Ontario, and Clydach, Wales, from ores of the Frood and Garson mines, are treated. This plant is equipped to refine, at low cost, approximately 300,000 ounces of high purity platinum metals per annum. In British Columbia platinum occurs erratically in the placer deposits of the Tulameen, Quesnel and Findlay rivers.

The world's production of the platinoids is rather difficult to compile owing to the dearth of reliable information regarding the Russian output. It is stated by the Soviet Union in 1930 that the annual production during the last ten pre-war years was about 11,500 pounds. The whole present output of the Ural Platinum Trust is disposed of to the Commissariat for Russian finance at prices based on those of the London market. A five-year plan had been worked out by the trust for the complete restoration of the industry. It is reported that this plan has been completed to a very large extent. An estimate of the 1929 Russian production of crude platinum is approximately 100,000 ounces. This output including some iridium, rhodium and ruthenium, is recovered from alluvial formations in the Urals. Colombia, one of the larger producers of these metals, showed a production of 42,382 ounces in 1930. The platinum metals occur in this country in alluvial sands and are recovered largely by dredging. In 1928 South Africa became the world's third greatest producer of platinum. The metal is found, in this field, in the almost vertical dunite pipes of the Lydenburg district; in the large irregular lenses of the Potgietersrust area; and in relatively narrow and very extensive tabular ore bodies of the Rustenberg and Lydenburg districts. Other producing countries include Australia, Tasmania, United States and Abyssinia.

Electrolytic and sponge platinum metals are utilized in the manufacture of iridium-platinum-palladium jewellery alloys, electrical instruments and machinery, high temperature thermocouples, vacuum tube amplifiers, heating elements, electro-plated table ware, catalysts, chemical ware, dental supplies and many other products.

The 1930 production of 34,024 ounces of platinum and 34,092 ounces of palladium, rhodium, iridium, etc., in Canada constitutes the highest Canadian production on record and is the direct result of the increased output of mineral products from the mines and metallurgical plants of the International Nickel Company.

Prices for platinum have fluctuated greatly. In 1883 it was quoted as low as \$5.49 per troy ounce; during 1923 it reached \$125 later receding to \$72 in 1927, while in July, 1930, it sold for less than \$45 an ounce.

Table 127.—Production of the Platinum Group Metals in Canada, 1929 and 1930

	Platinum		Palladium, Rhodium Iridium, etc.	
	Ounces	Value	Ounces	Value
1929		\$		\$
Ontario.....	12,474	843,928	17,141	802,453
British Columbia.....	45	2,828	177	6,836
Total.....	12,519	846,756	17,318	809,289
1930				
Ontario.....	34,000	1,542,172	34,040	894,511
British Columbia.....	24	1,089	52	1,356
Total.....	34,024	1,543,261	34,092	895,867

Table 128.—Production of Platinum in Canada from Alluvial Sands, 1921-1930

(For years 1887 to 1920 see 1928 Mineral Production of Canada)

Year	Fine ounces	Value	Year	Fine ounces	Value
		\$			\$
1921.....	23	1,558	1926.....	50	4,258
1922.....	12	1,154	1927.....	11	960
1923.....	7	816	1928.....	49	2,819
1924.....	5	569	1929.....	28	1,699
1925.....	6	715	1930.....	17	771

Table 129.—Production of Metals of the Platinum Group, 1921-1930

(From 1887 to 1920 see Mineral Production of Canada, 1928)

Year	Platinum				Palladium	
	Lode		Placer		Fine oz.	\$
	Fine oz.	\$	Fine oz.	\$		
1921.....	269	21,014	23	1,585	590	26,613
1922.....	458	44,709	12	1,154	724	47,060
1923.....	1,210	141,010	7	816	1,732	138,560
1924.....	9,181	1,090,858	5	569	8,923	811,993
1925.....	8,692	1,027,477	6	715	7,856	608,727
1926.....	9,471	919,349	50	4,258	9,790	626,166
1927.....	11,217	716,653	11	960	11,247	541,319
1928.....	10,483	706,090	49	2,819	11,909	511,998
1929.....	12,491	845,057	28	1,699	12,408	471,614
1930.....	34,007	1,542,490	17	771	29,959	689,217

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1921.....	256	3,433			11			
	56							
1922.....	104				391	31,280		
1923.....	206	18,540					98	26,460
1924.....	367	27,500	78	2,106	69	4,924	79	16,590
1925.....					432	40,242		
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			242	78,553
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						

(a) Includes osmium, iridium and ruthenium as other platinum metals.

Platinum is recovered in a small way at the Royal Mint in the form of platinum black a dull black powder of metallic platinum, obtained from the treatment of dental and old jewellery scrap. The following tables show the recoveries since 1923.

Table 130.—Recovery of Platinum "Black", at the Royal Mint, Ottawa, 1923-1930

	Platinum
	Ounces gross
1923.....	4.520
1924.....	16.186
1925.....	9.500
1926.....	10.700
1927.....	54.150
1928.....	16.350
1929.....	34.200
1930.....	20.246

Table 131.—Imports into Canada and Exports of Platinum, 1928-1930

	1928		1929		1930	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
		\$		\$		\$
IMPORTS—						
Crucibles.....		10,838		13,019		12,249
Wire and bars, strips, sheets or plates, platinum, palladium, osmium, ruthenium and rhodium in lumps, ingots, powder, sponge or scrap.....		136,777		157,774		87,467
Retorts, pans, condensers, tubing and pipe when imported by manufacturers of sulphuric acid for use exclusively in the manufacture or concentration of sulphuric acid in their own factories.....		2,881		41,113		23,135
Total.....		150,496		211,906		122,851
EXPORTS—						
Platinum contained in ores and concentrates.....	1,212	77,908	2,798	220,200	19,835	1,610,945
Old and scrap.....	424	27,463	112	5,319	285	15,653
Total.....		105,371		225,519		1,626,598

Table 132.—Monthly Average Prices of Refined Platinum, 1928-1930

(From *The Engineering and Mining World*)

(In dollars per fine ounce)

Month	1928	1929	1930
	\$	\$	\$
January.....	79-280	70-000	61-923
February.....	84-783	70-000	59-909
March.....	80-000	70-000	54-769
April.....	80-000	70-000	46-462
May.....	78-000	68-615	46-000
June.....	78-000	68-000	46-000
July.....	78-000	68-000	43-692
August.....	78-000	68-000	41-462
September.....	78-000	66-000	36-080
October.....	78-000	65-000	36-000
November.....	76-417	65-000	36-000
December.....	74-480	63-240	36-000
Average.....	78-580	67-655	45-358

Table 133.—Platinum Metals Consumed in the United States as Reported by Refiners and by Industries, 1929 and 1930

(From *Mineral Resources of the United States, 1930.*)

(In Troy ounces)

Industry	Platinum	Palladium	Iridium	Others	Total	Percentage of total
1929						
Chemical.....	20,260	1,345	113	233	21,951	11-00
Electrical.....	20,746	13,856	1,014	89	40,705	21-00
Dental.....	13,051	12,156	788	236	26,231	14-00
Jewellery.....	84,039	4,451	3,737	851	93,078	49-00
Miscellaneous.....	7,234	1,048	347	1,025	9,654	5-00
Total.....	145,330	37,856	5,999	2,434	191,619	100-00
1930						
Chemical.....	15,022	854	34	49	15,959	13-00
Electrical.....	8,529	9,569	864	70	19,032	16-00
Dental.....	11,810	15,436	111	6	27,363	23-00
Jewellery.....	44,801	2,807	2,407	526	50,541	43-00
Miscellaneous.....	3,324	1,621	208	876	6,029	5-00
Total.....	83,846	30,287	3,624	1,527	118,924	100-00

Table 134.—World Production of Platinum Metals, 1928-1930

(Supplied by Imperial Institute)

(Fine ounces)

Country and Product	1928	1929	1930
BRITISH EMPIRE			
<i>Sierra Leone</i> —			
Crude.....		26	542
<i>Union of South Africa</i> —			
Crude (content).....	14,656	24,084	49,375
Concentrates (content).....	9,007	5,730	5,967
Osmiridium.....	5,671	5,810	5,732
<i>Canada</i> —			
Platinum from placers.....	49	28	(a)
Recovered from Ontario nickel-copper matte—			
Platinum.....	10,452	12,474	34,000
Palladium.....	11,389	12,231	29,907
Other metals.....	1,689	4,910	4,133
<i>New South Wales</i> —			
Platinum from placers.....	354	128	155
<i>Tasmania</i> —			
Osmiridium from placers.....	1,627	1,360	953
<i>New Zealand</i> —			
Platinum from placers.....	(b) 35	7	3
<i>Papua</i> (years ended June 30)—			
Osmiridium from placers.....	215	29	11
FOREIGN COUNTRIES			
<i>Russia</i> —			
Crude platinum.....	(e) 100,000	(e) 100,000	(a)
<i>Abyssinia</i> —			
Platinum.....	3,247	3,842	3,805
<i>Mexico</i> —			
Platinum from placers.....			
<i>United States</i> —			
Platinum from placers.....	528	797	527
Domestic crude platinum purchased by refiners.....	365	516	797
New platinum metals recovered by refineries (c).....	59,039	47,977	43,502
<i>Colombia</i> —			
Platinum from placers (d).....	53,531	45,577	42,382
<i>Japan</i> —			
Platinum from placers.....	100	147	128

(a) Information not available.

(b) In addition 10 dwt. of osmiridium were produced.

(c) Includes recoveries from imported materials.

(d) U.S. Bureau of Mines figures.

(e) Estimated.

CHAPTER FIVE

MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics, Showing Production by Provinces, Imports, Exports, Prices and World Output Tables on Aluminium, Antimony, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Manganese, Mercury, Molybdenum, Tin and Tungsten.

1. General Review

Metal-bearing minerals, mined or treated usually by a very few operators, have been grouped in this chapter for consideration as a single industry. The iron and steel industry is one of the larger and better organized in Canada; ores utilized in Canadian iron furnaces are imported either from the Mesabi range in Minnesota, U.S.A., or from the Wabana deposits on Bell Island, Newfoundland. Iron ores consisting of hematite, siderite and magnetite occur in rather extensive deposits in Canada. These ores are usually of lower grade than those imported and their utilization in the Canadian steel industry would necessitate the employment of beneficiation methods. The Canadian aluminium industry is also very important; the production of this metal in the Dominion comes entirely from the province of Quebec. Bauxite, the crude aluminium ore employed in these plants is imported from foreign sources.

This chapter also includes a review of the occurrences of antimony, chromium, manganese mercury, molybdenum, radium, tin and tungsten in Canada. The mining of these metals in Canada at the present time is relatively unimportant, and their future economic value will be largely determined by the existing demand and the extent of available supplies from other producing countries.

Some of these smaller industries have, in the past, attained considerable importance and it is probable that future technical research and industrial requirements may once again stimulate expansion in these and other undeveloped mineral fields.

For historical purposes and to provide the interested reader with available data, tables have been prepared for this report that set out the known facts regarding production in these industries.

During 1930 mining operations on properties included in the miscellaneous metal group were rather widespread in Canada. In Nova Scotia, prospecting was conducted on a tungsten property located at Waverley, Halifax county; manganese ores were mined and shipped from deposits in both Nova Scotia and New Brunswick, while in British Columbia a test shipment of this ore was made from the "Smuggler group" located on Birch Island. Molybdenite ore was developed at the Tidewater mine on Alice Arm in British Columbia; chromite deposits were under development in the Thunder Bay district of Ontario and on Scottie Creek north of Ashcroft, British Columbia; a small shipment of this ore was made for experimental purposes from the Ontario property. Underground operations were conducted at the Lake George antimony mine in York county, New Brunswick. Titaniferous ores were mined and shipped from the Baie St. Paul district, Quebec; radium-bearing deposits were prospected in eastern Ontario and on the North East shore of Great Bear Lake in the Northwest Territories; in the Lillooet district of British Columbia a deposit of mercury ore, consisting of cinnabar impregnations was under development near Tyaughton creek.

Table 135.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1929 and 1930

	1929			1930		
	Number of employees		Salaries and wages	Number of employees		Salaries and wages
	Male	Female	\$	Male	Female	\$
Salaried Employees—						
Total.....	5		11,090	12		21,771
Wage-Earners—						
Surface.....	62		31,747	81		88,325
Underground.....	27			19		
Mill.....				4		
Total.....	89		31,747	104		88,325
Grand Total.....	94		42,837	116		110,096

Table 136.—*Wage-Earners in the Miscellaneous Metal Mining Industries in Canada, by Months, 1929 and 1930

Month	1929				1930			
	Number of wage-earners				Number of wage-earners			
	Surface	Under-ground	Mill	Total	Surface	Under-ground	Mill	Total
January.....					25			25
February.....					31			31
March.....					27	6		33
April.....					27	10		37
May.....	8			8	47	16	4	67
June.....	40	23	6	69	66	18	4	88
July.....	42	26	6	74	78	20	4	102
August.....	40	20	8	68	86	20	4	110
September.....	27	20	8	55	58	20	4	82
October.....	40	20	8	68	52	20	4	76
November.....	12	20	8	40	4	10		14
December.....	12	20	8	40	4	11		15

*See note page 37.

2.—Commodity Statistics on Aluminium, Antimony, Beryllium, Bismuth, Cadmium, Chromite, Iron Ore, Pig Iron, Ferro-Alloys, Steel and Rolled Products, Manganese, Mercury, Molybdenum, Tin and Tungsten

ALUMINIUM

Aluminium ores have not yet been found in commercial quantities in Canada. Metallic aluminium has been produced from imported ores by the Aluminium Company of Canada at Shawinigan Falls, Quebec, since 1903. This same company constructed an additional aluminium reduction plant in 1926 at Arvida on the upper reaches of the Saguenay river. Bauxite ore, a hydrous aluminium oxide, is imported principally from the United States, minor quantities of this mineral have also been obtained from British Guiana.

As there is only one Canadian company producing primary aluminium, statistics regarding the smelting operations have been included with data supplied by the smelters producing non-ferrous metals from Canadian ores. Production of aluminium hollowware, such as kitchen utensils, and other fabricated products, is reviewed annually in the Bureau's report on the Manufactures of the Non-Ferrous Metals.

Aluminium is a product of the electric furnace; alumina which has been recovered by chemical means from bauxite, is dissolved in molten cryolite in the electric furnace; a low voltage current decomposes the oxide into metallic aluminium and oxygen, the metal sinks to the bottom of the crucible. All cryolite ore is obtained from Greenland. Aluminium, in addition to its use in the pure state, is alloyed with other metals including copper, nickel, cobalt, iron, antimony, tin, zinc, beryllium and magnesium. Pure aluminium powder is used in the thermit process to reduce the oxides of certain metals to the metallic state.

The World War gave a tremendous stimulus to aluminium production. In 1915 the world's aluminium output was 68,000 tons; in 1929 it reached 299,040 short tons with a recession to 293,440 short tons in 1930. According to the American Bureau of Metal Statistics the production of aluminium in the United States amounted to 103,890 metric tons in 1930.

In France about 90 per cent of the aluminium is manufactured by the Pechiney-Ugine Union. This company has nine factories in France together with investments in Norway, Spain and Russia. The Pechiney-Ugine Union has created a new company for the manufacture of magnesium by the electrolysis of magnesium chloride.

Consumption of aluminium is increasing with remarkable rapidity. This metal and its alloys are now being utilized in the construction of electrical transmission cable, motor car bodies and parts, railroad coaches, street cars, oil tanks, radio equipment, window frames, flooring, girders, aircraft, and a host of other metal manufactures.

Table 137.—Imports of Aluminium and its Products into Canada and Exports of Aluminium, 1928-1930

	1928		1929		1930	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Alumina.....	65,748,300	1,494,545	910,000	25,026	188,300	10,757
Bauxite ore†.....	261,767,100	2,842,237	284,477,400	3,202,728	213,556,400	3,072,335
Cryolite ore.....	6,926,500	297,629	4,801,900	194,638	4,755,900	201,355
Aluminium—						
Ingots or blocks†.....	119,018	29,340	317,091	76,411	162,059	40,691
Bars and rods†.....	179,474	59,523	533,604	174,659	2,578,281	575,158
Sheets, strips or plates†.....	646,552	190,584	701,353	220,357	1,216,852	345,307
Ingots, blocks, bars, rods, strips, sheets or plates*.....	451,166	136,362				
Leaf or foil.....		233,011		197,164		233,375
Tubing.....	87,468	46,430	144,840	70,446	147,054	71,381
Net floats for sea or lake fishing only†.....		637				
Household hollow-ware.....		284,740		393,577		372,132
Manufactures, n.o.p.....		1,110,090		1,482,288		1,373,781
Total.....		6,725,128		6,037,294		6,296,272
EXPORTS—						
Aluminium—						
Bars, blocks, etc.....	40,597,100	8,049,367	72,970,800	13,210,023	43,327,800	7,753,795
Kitchen utensils and hollow-ware†.....		46,384		48,233		19,453
Scrap.....	1,800,300	249,066	3,416,200	455,326	2,750,600	381,408
Manufactures, n.o.p.....		712,874		1,430,927		1,775,774
Total.....		9,057,691		15,144,509		9,930,430

†April 1 to December 31, 1928.

*January 1 to March 31, 1928.

Table 138.—Monthly Average Prices of Ingot Aluminium, 1928-1930

(At New York in cents per pound 98 per cent grade)

(From the *Engineering and Mining World*)

Month	1928	1929	1930
January.....	24.300	24.300	24.300
February.....	24.300	24.300	24.300
March.....	24.300	24.300	24.300
April.....	24.300	24.300	24.300
May.....	24.300	24.300	24.300
June.....	24.300	24.300	24.140
July.....	24.300	24.300	23.300
August.....	24.300	24.300	23.300
September.....	24.300	24.300	23.300
October.....	24.300	24.300	23.300
November.....	24.300	24.300	23.300
December.....	24.300	24.300	23.300
Average.....	24.300	24.300	23.787

Table 139.—Estimated World Production of Aluminium, 1928-1930

(Supplied by *Imperial Institute*)

(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	10,640	8,960	14,560
Canada.....	28,000	42,560	35,840
Total.....	38,640	51,520	50,400
FOREIGN COUNTRIES			
Austria.....	3,360	4,480	3,360
France.....	(b) 28,513	(b) 32,059	27,104
Germany.....	34,720	35,840	33,824
Italy (b).....	3,988	8,128	8,783
Norway (b).....	27,315	32,124	30,156
Russia (c).....	(a)	(a)	224
Spain.....	(b) 8	(b) 1,120	1,232
Switzerland.....	42,416	21,280	23,296
United States.....	105,000	112,504	114,518
Total.....	227,360	247,520	243,040
World's Total.....	266,560	299,040	293,440

(a) Information not available.

(b) Official figures.

(c) Years ended April 30, 1931.

Table 140.—World Production of Bauxite, 1928-1930

(Supplied by Imperial Institute)

(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
Northern Ireland.....	2,559	2,601	2,281
British Guiana.....	221,444	242,650	164,636
India.....	16,427	10,084	2,816
Australia.....	216	612	(a)
Total.....	240,800	256,480	170,240
FOREIGN COUNTRIES			
France.....	701,120	734,523	670,695
Germany.....	5,600	7,998	.....
Greece.....	330	6,923	1,452
Hungary.....	436,265	428,967	34,938
Italy.....	178,827	212,496	177,678
Jugoslavia.....	54,304	102,542	104,388
Roumania.....	720	1,020	747
Russia (years ended Sept. 30).....	(a)	(a)	13,440
Spain.....	199	1,075	356
United States.....	420,477	409,670	370,285
Dutch Guiana (exports).....	235,747	231,483	291,622
Total.....	2,038,400	2,139,200	1,668,800
World's Total.....	2,273,600	2,396,800	1,836,800

Information regarding Austrian production is not available.

(a) Information not available.

Table 141.—Production (Exports) of Cryolite from Greenland, 1926-1930

	Short tons
1926.....	27,375
1927.....	21,268
1928.....	28,587
1929.....	32,827
1930.....	39,952

ANTIMONY

Antimony bearing minerals are known to occur in British Columbia, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, and the Yukon. The greater part of the Canadian output of refined antimony was produced in the years 1907, 1909, 1915 and 1916 by the Consolidated Mining and Smelting Company at Trail, B.C.; the metal was recovered as a by-product in the treatment of silver-lead ores. The remainder of the Canadian antimony production came from deposits mined in Nova Scotia and New Brunswick.

A vein containing auriferous stibnite and native antimony associated with arsenopyrite, pyrite, and galena was mined at West Gore, Hants County, Nova Scotia, during the war period; the ore was milled at the property to yield a 38 to 45 per cent antimony concentrate. There has been no Canadian production of antimony since 1926.

Stibnite with small quantities of native antimony were discovered about 1850 in the slates and quartzites at Prince William, York county, New Brunswick. Local attempts to reduce the ore were failures, crude ore was then shipped until the property closed in 1890. During the late war period this ore was smelted and refined near Lake George.

Antimony ores are rare in the province of Ontario. Minerals containing this metal have been found in Hastings, Addington and Frontenac counties and in the silver ores of the Cobalt district. Antimony deposits have been partially developed in South Wolfe county, Quebec.

There are several occurrences of antimony in British Columbia. In the Bridge river area, Lillooet mining division, stibnite occurs in quartz; the ore here contains on the average, 40 to 60 per cent antimony and is free from arsenic, zinc and lead. A few shipments have been

made from a deposit on the north fork of Carpenter creek in the Slocan district. Antimony has also been found on Graham Island, at Tatlayoko lake, Nanaimo district, and in the vicinity of Kamloops lake where it is associated with cinnabar.

In the Yukon Territory antimony ores occur in the Carbon and Chieftain hills near the Wheaton river.

Antimony is used in the manufacture of battery plates, grids, bearings, babbitt metal, solder, rubber goods, paints, fixtures, and for a variety of other purposes.

The United States Bureau of Mines state the low prices prevailing in 1930 did not encourage antimony production in the higher cost countries. In China, always the leading source of supply, local difficulties interrupted production and shipments. Despite the world-wide curtailment of demand, therefore, there was no indication of any abnormal accumulation of stocks in the producing countries at the close of the year. The world production of metallic antimony is about 30,000 short tons a year of which the United States consumes more than one-third.

Table 142.—Production of Antimony in Canada, 1886-1930

Year	Antimony ore		Refined regulus		Antimony in silver-lead-bismuth bullion exported	
	Tons	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1886.....	665	31,490				
1887.....	584	10,860				
1888.....	345	3,696				
1889.....	55	1,100				
1890.....	26½	625				
1891.....	10	60				
1892-1897.....						
1898.....	1,344	20,000				
1899-1904.....						
1905 (a).....	527					
1906 (a).....	782					
1907.....	2,016	65,000	63,850	5,108		
1908 (b).....	148	5,443				
1909.....	35	1,575	61,207	4,285		
1910.....	364	13,906				
1911-1914.....						
1915.....	1,341	81,283	59,440	11,888		
1916.....	885	94,537	107,185	41,823		
1917.....	361	22,000				
1918-1924.....						
1925.....					1,751	206
1926.....					1,596	281
1927-1930.....						

(a) As recorded by the Nova Scotia Department of Mines: no value given.

(b) Exports.

Table 143.—Imports of Antimony into Canada, 1928-1930

	1928		1929		1930	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Antimony, or regulus of.....	1,529,823	140,958	1,746,525	147,643	1,303,560	87,027
Antimony salts, viz.: Tartaremetic, chloride and lactate (antimonine).....	16,930	3,837	58,829	8,703	14,168	2,862
Antimony salts for dyeing.....	6,096	1,490	220	119	6,978	829
Total.....		146,285		156,465		90,718

Table 144.—Monthly Average Prices of Antimony, 1928-1930(Compiled from quotations given in the *Engineering and Mining World*—"Ordinaries" stand for Hungarian, Chinese or other "Foreign" brands)

(At New York in cents per pound)

Month	1928	1929	1930
	Ordinaries	Ordinaries	Ordinaries
January.....	10-863	9-558	8-606
February.....	10-812	9-548	8-830
March.....	10-083	9-531	8-236
April.....	9-865	9-462	7-740
May.....	11-019	8-957	7-454
June.....	9-750	8-845	7-057
July.....	9-540	8-543	6-976
August.....	10-181	8-778	7-839
September.....	10-813	8-709	7-773
October.....	10-841	8-538	7-288
November.....	10-109	8-583	7-105
December.....	9-748	8-420	7-099
Average.....	10-305	8-956	7-667

World Production of Antimony.—China is by far the greatest antimony-producing country in the world, and as consumption of antimony in that country is only 1 per cent of its production, large quantities are available for export. There are many valuable deposits in the various provinces of China, but in the province of Hunan alone there is said to be 2,000,000 tons, much of which has not been developed.

Table 145.—World Production of Antimony, 1928-1930

(In terms of metal)

(Supplied by *Imperial Institute*)

(short tons)

Producing Country	1928	1929	1930
BRITISH EMPIRE			
Southern Rhodesia.....	55		38
India (ore).....	414	86	3
Australia.....	55	30	75
FOREIGN COUNTRIES			
Austria.....	1,260	784	
Czechoslovakia.....	1,332	766	423
France.....	952	1,344	1,456
Greece.....		75	(a)
Italy.....	316	423	463
Jugoslavia.....	142	175	2
Spain.....	9		(a)
Morocco.....	11	198	(a)
Mexico.....	3,944	2,987	3,342
United States.....	41		
Bolivia (exports).....	3,905	4,165	(a)
Peru.....	155	119	(a)
China (exports)—			
Oxide.....	2,388		
Crude.....	2,176	4,295	2,565
Regulus.....	18,138	22,116	17,662
Turkey.....	108	8	18
World's Total.....	35,840	34,720	30,240

(a) Information not available.

BERYLLIUM

Shipments of beryl crystals were made to Germany in 1927 from a deposit in Lyndoch township, Ontario. Beryl occurrences in the pegmatites of eastern Manitoba have been investigated during recent years. Beryllium is a steel-grey metal, it easily tarnishes in air and shows a complete lack of ductility at ordinary temperatures. The density is 1.84 or less than that of aluminium. A remarkable property of beryllium, and one which has already been put to extensive practical use, is the fact that it is remarkably transparent to X-rays.

There are three principal groups of beryllium alloys: those with aluminium, those with copper, and those with iron. The presence of beryllium confers a corrosion resisting property to silver and it is reported that attempts will be made to use this alloy as a true "Stainless silver." Beryllium copper alloys have a fairly high conductivity and are substantially stronger than copper in the pure state. Various patents have been taken out covering certain of the iron-beryllium alloys.

BISMUTH

Bismuth occurs in small quantities with ores of the Cobalt district and in ores treated at the Trail smelter in British Columbia. In 1930, 12,732 pounds of bismuth were contained in a silver-lead-bismuth bullion exported for treatment in the United States, this was valued at \$6,366.

The chief uses of bismuth are in the manufacture of pharmaceutical chemicals and in low melting alloys. It has been recently suggested that great possibilities exist for the adoption of this metal in solder and sheathing for telephone and telegraph cables.

The chief producers of bismuth are the United States, Bolivia and Spain, with smaller amounts from Japan and Peru; several other countries produce minor amounts. A large proportion of the metal, particularly in the United States and Peru, is recovered as a by-product in lead smelting; bismuth ores are mined in Bolivia and Spain.

Table 146.—World Production of Bismuth, 1928-1930

(Supplied by *Imperial Institute*)

(Cwt.—112 pounds)

Producing Country and Description	1928	1929	1930
BRITISH EMPIRE			
Canada—			
Metal.....	125	1,735	114
India—			
Ore.....	lb. 82	lb. 88	1
Australia—			
Ore, etc.....	152	66	83
FOREIGN COUNTRIES			
Czechoslovakia—			
Ore (Bi content).....	12	75	
Germany (Saxony)—			
Bismuth-cobalt-nickel ore.....	1,610	940	(a)
Spain—			
Ore.....	2,539	2,323	(a)
Metal.....	469	219	(a)
Argentina—			
Ore.....	417	145	(a)
Bolivia (exports)—			
Content of ore and concentrates.....	2,679	2,974	(a)
Peru—			
Ore (Bi content).....		613	(a)
Japan—			
Metal.....	633	984	1,079

(a) Information not available.

Bismuth was also recovered as a by-product in the refining of lead and zinc in the United States.

CADMIUM

Cadmium was produced in Canada for the first time in 1928 at the Trail refinery of the Consolidated Mining and Smelting Company Limited as a by-product in the refining of zinc.

The principal source of the world's cadmium are the electrolytic zinc plants of the Anaconda Copper Mining Company in the United States, the Electrolytic Zinc Corporation of Australasia at Risdon, Tasmania, and the Consolidated Mining and Smelting Company of Canada at Trail, British Columbia.

Zinc ores in Upper Silesia are relatively rich in cadmium and before the development of electrolytic zinc refining these ores were the principal source of cadmium. In Great Britain a small production of the metal, estimated at 20 to 25 tons yearly, is produced as a by-product of lithopone manufacture.

Principal cadmium importing countries are the United Kingdom, France and the United States. Germany is one of the largest cadmium consuming countries. This country, however, produces a considerable proportion of her requirements from domestic sources or from imported ores.

In certain of the industries, especially the automobile, cadmium has obtained a strong position as a plating metal. It is not only used as a direct surface protection but as an intermediate plating medium. The metal is also used in silver, gold, copper and fusible alloys. The use of cadmium in bearing metals promises to increase the world's production of this metal.

For many years cadmium sulphide, a brilliant yellow pigment, has been extensively used for painting street cars, passenger coaches and other objects and materials where freedom from attack of sulphurous gases was desired; the quantity thus used sometimes exceeding that used as metal. The oxide, hydroxide, and sulphate are used for electrolytes in the various cadmium-plating processes. Other cadmium compounds such as the chloride, iodide, bromide, and nitrate find various uses in the chemical industries.

Practically all the world's production comes from the treatment of impure zinc solutions used for preparing electrolytic zinc, the potential output of cadmium therefore bears a very direct relation to the amount of electrolytic zinc produced. Some cadmium is produced from smelter flue dusts and a certain amount from the purification of zinc solutions used for making lithopone.

Table 147.—World Production of Cadmium, 1928-1930

(Supplied by Imperial Institute)

(Lb. avdp.)

Country	1928	1929	1930
BRITISH EMPIRE			
Canada.....	491,894	773,976	456,600
Australia.....	385,616	445,907	509,598
FOREIGN COUNTRIES			
Belgium (exports).....	11,464	5,071	11,244
France.....	103,600	130,000	(a)
Germany (estimated).....	100,000	100,000	100,000
Italy (estimated).....	(a)	(a)	26,500
Poland.....	9,238	7,901	(a)
United States:—			
Metal.....	1,875,896	2,481,427	2,777,762
Compounds (metal content).....	239,900	433,300	316,300
Mexico (b).....	779,431	1,413,092	1,207,564

NOTE.—Cadmium is also produced in Russia and Sweden but statistics are not available.

(a) Information not available.

(b) Recorded as cadmium but probably zinc-cadmium fume sent to the United States for treatment.

CHROMIUM

The mineral chromite (FeO , Cr_2O_3) is the commercial source of the metal chromium which is of prime importance in the manufacture of chrome steel armour plate and other similar steels. Chromium is a necessary constituent of many high-speed cutting tools, and its use is well established in the manufacture of stainless steels, in which it makes up from 12 to 14 per cent of the alloy.

Quebec has been the main source of chromite ore in Canada. Rhodesia, India, and New Caledonia, supply over 90 per cent of the world's chromite.

During the war when the higher grades of ore from other continents were not easily obtainable, many low-grade deposits in Canada and the United States were opened up, and for a time considerable metallurgical research was done in Canada on the reduction of chromium-bearing ores. Chromium metal may be obtained from chromium oxide by reduction with aluminium. The metal made in this manner is very pure and free from carbon. In less pure form, it has been made in the electric furnace directly from the ore. The resultant product made in this manner contains small percentages of iron and carbon but not sufficient to cause any serious trouble when the metal is used in the manufacture of alloys. Ferrochrome, also a product of the electric furnace, is made from a good grade of chromite ore, and the iron chromium alloy runs about 60 to 70 per cent chromium. This alloy can then be added in the required amounts to a bath of molten steel. Ferrochrome requirements take about 40 per cent of the world's supply of chromite; about 35 per cent of the chromite produced is used in the manufacture of chromite refractories such as brick and other furnace linings, and 25 per cent is used in the manufacture of chemicals.

Considerable research on the plating of chromium has resulted in much success. Because it does not tarnish readily and as chromium plate has a brilliant blue-white lustre, the use of chromium as a plating material has been greatly extended in recent years.

There has been no important production of chromite in Canada since 1923 when 3,558 tons valued at \$52,650 were produced, in 1929 a property in British Columbia shipped 126 tons of this ore.

Systematic exploration and prospecting were carried on during the past two years on chromite occurrences situated to the west of Lake Nipigon, Ontario.

Table 148.—Production of Chromite in Canada, 1886-1930

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1886.....	60	945	1911.....	157	2,587
1887.....	38	570	1912-13.....		
1888-93.....			1914.....	136	1,210
1894.....	1,000	20,000	1915.....	12,341	179,543
1895.....	3,177	41,300	1916.....	(a) 27,517	311,460
1896.....	2,342	27,004	1917.....	(a) 36,725	499,682
1897.....	2,637	32,474	1918.....	21,994	867,122
1898.....	2,021	24,252	1919.....	8,541	228,898
1899.....	2,010	21,842	1920.....	11,016	251,379
1900.....	2,335	27,000	1921.....	2,798	55,696
1901.....	1,274	16,744	1922.....	767	11,503
1902.....	900	13,000	1923.....	3,558	52,650
1903.....	3,509	51,129	1924-1928.....		
1904.....	6,074	67,146	1929.....	126	900
1905.....	8,575	93,301	1930.....		
1906.....	9,035	91,859			
1907.....	7,196	72,901			
1908.....	7,225	82,008			
1909.....	2,470	26,604			
1910.....	299	3,734			
			Total.....	187,853	3,176,443

(a) A portion of this ore was sold to a customs mill in the district and the final shipments of ores and concentrates in 1916 were 15,249 short tons valued at \$310,902 or an average of \$20.39 per ton; and 23,713 tons valued at \$581,796 or an average of \$24.54 per ton in 1917.

Table 149.—Production in Canada of Chromite, and Imports of Chromium Products, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....			126	900		
IMPORTS—						
Bichromate of soda.....	1,045	122,378	898	127,828	985	142,041
Bichromate of potash.....	97	17,155	84	14,955	40	7,383
Brick, fire, chrome.....		56,375		101,302		73,761
†Chromite steel.....	4,434	264,659	3,510	220,890	2,234	123,335

†January 1 to March 31, 1930.

Table 150.—World Production of Chrome Ore, 1928-1930

(Supplied by *Imperial Institute*)

(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
Southern Rhodesia.....	219,428	293,116	226,671
Union of South Africa.....	35,006	70,520	15,129
Cyprus (shipments).....		2,737	1,689
Canada.....		127	2
India.....	50,910	55,513	56,766
Australia.....		144	188
Total.....	305,760	422,240	300,160
FOREIGN COUNTRIES			
Greece.....	23,097	26,692	18,866
Jugoslavia.....	18,387	47,424	56,653
(a) Russia (years ended Sept. 30).....	24,214	31,360	72,831
Cuba.....	32,088	44,531 (b)	40,203
United States.....	412	608	90
Brazil (exports).....	22	77	11
French Indo-China.....			1,680
Japan.....	10,811	1,008	12,509
Turkey.....	13,061	11,109	30,970
New Caledonia.....	56,024	55,888	58,997
Total.....	179,200	224,000	291,200
World's Total.....	481,600	649,600	593,600

(a) Ore not requiring concentration. In addition to this in 1928 there were 17,500 tons of ore requiring concentration and 5,882 tons of concentrates produced.

(b) Imports into the United States.

IRON ORE

Iron ore was first discovered in Canada in the St. Maurice valley, Quebec, as early as 1667, or perhaps earlier. Count Frontenac mined ore there five years later and the samples, tested in France, were found to be of workable quality.

In 1730 M. Franchville was granted a licence by Louis XIV of France together with a subsidy of 10,000 'livres' to work the St. Maurice iron mines. The project contemplated the construction of a blast furnace which apparently was not successful for, in 1735, he surrendered his rights to the government. Some years later another licence and a subsidy were given La Compagnie des Forges which made not only the iron kettles that were needed by the pioneers for making sugar and soap but furnished the French government with cannon for military enterprises. In 1743 the plant again reverted to the crown and was operated by the government until the country passed into the hands of the British.

Nova Scotia with its large iron and steel industry is not at present a producer of iron ore. Deposits of iron ore of various kinds are numerous throughout a large part of the province, Nova Scotia ranks next to Ontario in the matter of total production, however the large deposits of high-grade iron ore in Newfoundland owned and operated by the British Empire Steel Corporation, are much more readily accessible and of a higher and more constant grade than the deposits in Nova Scotia and for that reason the local deposits are not mined.

Iron ore mining and smelting were carried on to a small extent in New Brunswick but the ore was low-grade and the operations did not prosper.

Iron ore was first mined and smelted in the province of Quebec early in the eighteenth century, and from that time until 1883 the industry was carried on almost continuously at Three Rivers in the St. Maurice district. Other furnaces using local ore were operated at Radnor Forges and at Drummondville, the last to shut down being the Drummondville furnace in 1911. The ores used were bog ores, with charcoal for fuel. The output of all the furnaces was small and the industry owed its success to the superior quality of the pig iron produced.

Furnaces have also been built at various times and places in attempts to smelt some of the other classes of ore found in the province, these were all short lived, and none achieved commercial success.

More iron ore has been produced in Ontario than in any other province to date but at the present time no properties are producing. About 1896 a system of bounties, inaugurated by the Federal and Provincial Governments to encourage the manufacture of iron and steel from native ores, had the desired effect of stimulating the industry and the following year, blast furnaces were erected at various points in the province. Strenuous efforts were made to use Ontario ores as far as possible and thus obtain advantages of the bounties offered.

As a result, iron mining and prospecting for iron ore were stimulated but the grade found was generally low and contained deleterious material to such an extent that it was soon found unprofitable to operate.

In northwestern Ontario about 1899, a deposit of hematite that later developed in to the Helen mine, was found, this mine proved the main source of Ontario's iron output for a number of years. The high grade ore was exhausted and the mine is now closed down. Ontario has a large supply of low-grade iron ore, but beneficiation processes must be applied to make these ores suitable for commercial use.

Production of iron ore in British Columbia has been almost negligible up to the present time, however the small production has not been caused so much by the lack of ore as by the scarcity of a market for the ore. Different varieties of iron ore are found in various parts of the province, the most important of which are the magnetite deposits which occur on the islands along the coast. In some deposits the sulphur content is high, which would necessitate a preliminary roasting before charging to the blast furnaces; the ores are easily mined, are close to tide-water and would supply for some years a small iron-smelting industry providing the local demand for the products would justify its establishment.

Prospecting expeditions in 1929 visited the large iron ore deposits of the Belcher islands in Hudson Bay and those of the Koksoak and Hamilton rivers in Ungava. It is stated that the Ungava deposits may afford, in the future, an almost inexhaustible supply of high grade iron ore.

Table 151.—Shipments of Iron Ore from Canadian Mines, by Provinces, 1921-1930

(For years 1886 to 1920 see Mineral Production of Canada, 1928)

(Short tons)

Year	Quebec	Ontario	British Columbia	Canada
1921.....		58,499	1,010	59,509
1922.....	526	16,190	1,255	17,971
1923.....	69	30,447	243	30,759
1924.....	1,408	44	28	1,480
*1925.....	3,978			3,978
1926.....	200			200
1927.....	2,039			2,039
1928.....	2,244			2,244
1929.....	2,748			2,748
1930.....	412			412

*1925-1930—shipments consist of titaniferous ore.

Table 152.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1921-1930

(For years 1895 to 1920 see Mineral Production of Canada, 1928)

Year	To Nova Scotia	To United States	To Great Britain and Europe	Total shipments
	Short tons	Short tons	Short tons	Short tons
1921.....	178,519		206,010	384,529
1922.....	211,482		811,845	1,023,327
1923.....	451,483		356,753	808,236
1924.....	174,602		919,968	1,094,570
1925.....	384,795		883,056	1,267,851
1926.....	455,961		503,640	969,601
1927.....	480,757	68,354	946,569	1,495,680
1928.....	690,316	41,493	1,001,833	1,733,642
1929.....	763,168	85,501	850,370	1,699,039
1930*.....	523,918	54,623	740,774	1,319,315

* European shipments in 1930 were to Germany only.

Table 153.—Imports into Canada, and Exports of Iron Ore, 1929 and 1930

	1929		1930	
	Quantity	Value	Quantity	Value
	Short tons	\$	Short tons	\$
IMPORTS—				
Iron ore from United States.....	1,640,500	3,999,239	867,344	2,103,170
Iron ore from Newfoundland.....	743,713	743,736	583,834	1,053,020
Iron ore from Sweden.....	58,554	266,317	34,251	168,000
Iron ore from other countries.....	5,040	16,973		
Total.....	2,447,807	5,026,265	1,485,429	3,324,190
EXPORTS—Total.....	3,859	19,461	558	3,025

Table 154—World Production of Iron Ore (Including Manganiferous Iron Ore)

(Supplied by Imperial Institute)

(Long tons)

Country	Ore			Estimated iron content		
	1928	1929	1930	1928	1929	1930
BRITISH EMPIRE						
Great Britain.....	11,262,323	13,214,943	11,627,233	3,378,697	3,964,483	3,604,442
Northern Ireland.....	806	689		240	200	
Northern Rhodesia.....	4,466	3,556	9	1,100	900	2
Southern Rhodesia.....	3,062	3,352	2,484	750	850	600
S. W. Africa.....	29,456	28,244	39,338	(a)	(a)	(a)
Union of South Africa.....	20,568	37,666	50,846	8,978	16,419	25,866
Newfoundland.....	1,486,178	1,494,452	1,177,961	772,000	777,000	612,500
India.....	2,055,992	2,428,555	1,849,625	1,320,000	1,550,000	1,180,000
Unfederated Malay States—						
Johore.....	644,635	743,209	702,801	412,566	475,654	449,793
Trengganu.....	20,049	66,309	74,984	12,600	41,800	47,200
Australia.....	675,092	852,960	936,609	446,000	563,000	618,000
New Zealand.....	12,725	8,043	16,150	7,000	4,300	(a)
Total.....	16,200,000	18,900,000	16,500,000			
FOREIGN COUNTRIES						
Austria.....	1,897,729	1,861,509	1,161,808	595,944	587,898	388,780
Belgium.....	161,823	153,211	128,921	73,000	69,000	58,000
Czechoslovakia.....	1,751,076	1,779,113	1,626,814	559,773	573,788	522,705
France.....	48,414,400	49,929,873	48,049,473	17,000,000	18,000,000	17,000,000
Germany.....	6,372,357	6,272,546	5,648,219	2,055,824	2,047,404	1,816,193
Greece.....	164,269	249,031	(a)	81,304	121,339	(a)
Hungary.....	196,395	247,882	154,935	(a)	(a)	(a)
Italy.....	631,947	710,606	717,849	309,619	326,077	352,916
Jugo-Slavia.....	432,539	443,676	424,378	238,000	244,000	235,000
Luxemburg.....	6,915,853	7,451,629	6,544,354	2,118,326	2,251,137	1,987,233
Norway.....	652,241	734,328	760,224	428,429	481,436	498,467
Poland.....	725,113	649,151	469,376	203,033	181,693	131,425
Portugal.....	14,000	11,589		7,500	6,250	
Roumania.....	82,544	88,592	91,056	36,000	39,000	40,000
Russia (years ended Sept. 30).....	5,830,858	7,010,000	10,602,000	(a)	(a)	(a)
Spain.....	3,693,411	6,455,471	5,437,519	2,740,500	3,134,700	2,570,000
Sweden.....	4,595,034	11,286,437	11,058,964	2,788,000	6,842,000	6,740,000
Switzerland (exports).....	64,664	87,048	100,316	(a)	(a)	(a)
Algeria.....	1,954,100	2,161,514	2,196,619	987,205	1,080,748	1,098,310
Belgian Congo.....	50,000	50,000	55,000	(a)	(a)	(a)
Morocco (Spanish).....	1,077,859	1,227,357	(a)	582,000	663,000	(a)
Tunis.....	895,000	958,000	815,000	470,000	500,000	430,000
Cuba (shipments).....	394,420	671,320	190,654	218,000	377,000	105,000
Mexico.....	79,025	(a)	(a)	49,000	(a)	(a)
United States (b).....	63,373,070	74,215,978	59,194,054	31,400,000	37,000,000	(a)
Brazil (estimated).....	30,000	30,000	30,000	20,000	20,000	20,000
Chile.....	1,500,694	1,783,807	1,693,349	990,458	1,177,313	(a)
China.....	2,003,800	(a)	(a)	1,000,000	(a)	(a)
Japan.....	155,215	175,000	(a)	98,000	110,000	(a)
Korea.....	496,409	543,099	524,087	280,000	303,000	293,000
Manchuria.....	664,953	769,000	(a)	(a)	(a)	(a)
Total.....	157,000,000	180,000,000	162,000,000			
World's Total.....	173,000,000	199,000,000	179,000,000			

(a) Information not available.

(b) Includes manganiferous iron ore up to 35% Mn.

(c) Year ended March 31st of the year following that stated.

PIG IRON AND FERRO-ALLOYS, STEEL AND ROLLED PRODUCTS

Statistics of pig iron, steel and rolled products, are regarded as belonging to "Manufactures" rather than to "Mining" but the close relation between the mining of iron ore and the production of pig iron and steel justifies the inclusion here of references to these secondary industries. The data given in this section have been taken from the Bureau's annual bulletin on *The Primary Iron and Steel Industry in Canada, 1930*.

Factory sales from the primary iron and steel industry in Canada during 1930 were valued at \$52,588,935. This value, which represents the amount actually received by producers for the sale of pig iron, ferro-alloys, steel ingots, direct steel castings and rolled iron and steel products, was 27 per cent below the corresponding figure for 1929 and 15 per cent below 1928 but exceeded the 1927 value by 15 per cent. The totals amounted to \$72,231,995 in 1929, to \$62,071,674 in 1928, and \$45,571,264 in 1927.

In 1930, a total of 34 firms operated 49 different plants or departments including blast furnaces, steel furnaces, ferro-alloy plants and rolling mills. The 19 plants in Ontario accounted for 58 per cent of the total sales for Canada; 6 in Nova Scotia took care of 22 per cent, 13 in Quebec 16 per cent, while the remaining 4 per cent was accounted for by 4 firms in Manitoba, 4 in British Columbia, and 3 in Alberta.

Capital employed by these concerns was reported at \$112,079,926; the average number of employees was 9,723, and salaries and wages totalled \$14,934,325. Expenditures for fuel and electricity amounted to \$5,182,136 and materials purchased for manufacturing purposes cost \$22,765,648.

Pig iron was made in 4 plants, ferro-alloys in 3, steel in 27, and rolled products in 16 plants.

(a) **Pig Iron**.—During 1930 the 4 manufacturers of pig iron in Canada produced 747,178 long tons of pig iron as compared with 1,080,160 tons in 1929, 1,037,727 tons in 1928, and 709,697 tons in 1927. Furnace charges for 1930 included 1,328,929 long tons of imported iron ore, 94,766 long tons of mill cinder, etc., 35,909 long tons of scrap, 401,688 short tons of limestone, and 796,040 short tons of coke.

Employees in the iron blast furnaces departments averaged 769 per month in 1930.

Imports of pig iron into Canada during 1930 amounted to 13,643 long tons, a decline of over 58 per cent from the total of 32,548 tons brought in during 1929. Exports were reported at 593 long tons as compared with 7,478 tons in the previous year.

(b) **Ferro-Alloys**.—Production of ferro-alloys in Canada during 1930 amounted to 65,223 long tons. This tonnage was exceeded only in 1929 when the record output of 89,116 tons was established. This year's output included ferromanganese, ferrosilico, speigelleisen, and silico speigel.

(c) **Steel Ingots and Direct Steel Castings**.—Production of steel ingots and direct steel castings in Canada totalled 1,009,578 long tons, a decline of 27 per cent from the 1,378,024 reported for the previous year. In 1928 output amounted to 1,234,719 tons and in 1927 to 907,945 tons. This year's output included 956,888 tons of steel ingots and 52,690 tons of direct castings. Of the ingots practically all, or 956,500 tons, were transferred to the producing companies own plants but of the castings only 6,643 tons were used by the producers. Sales of ingots by the producers totalled 2,143 tons and sales of direct castings were reported at 46,420 tons, the difference between the tonnage distributed and the tonnage made representing a reduction in stocks.

Of the 27 steel plants 9 were located in Quebec, 7 in Ontario, 4 in British Columbia, 3 in Manitoba, 2 in Nova Scotia and 2 in Alberta. They employed a monthly average of 3,746 people.

(d) **Rolling Mills**.—Rolling mill sales were valued at \$36,995,287 in 1930 as compared with \$50,758,322 in 1929 and \$46,565,831 in 1928. During the year 1,149,225 long tons of iron or steel passed through the mills and of this total 1,033,593 tons came from the producers' own plants and 115,632 tons were purchased.

The 16 mills in Canada for rolling iron or steel were located as follows:—7 in Ontario, 4 in Quebec, 3 in Nova Scotia, and 1 in each of Manitoba and Alberta. They employed a monthly average of 4,907 people.

Table 155.—Principal Statistics of the Primary Iron and Steel Industry in Canada, 1926-1930

Year	No. of plants	Capital employed	Average number of employees	Salaries and wages	(*) Cost of materials at works	Selling* value of products at works	Value added by manufacturing
		\$		\$	\$	\$	\$
1926.....	23	86,987,454	6,140	9,054,170	19,912,723	41,183,565	21,270,842
1927.....	26	96,295,734	7,396	11,809,198	18,993,940	45,571,264	26,577,324
1928.....	40	114,292,363	9,057	15,470,836	27,164,463	62,071,674	34,907,211
1929.....	45	109,446,529	11,218	18,534,681	32,514,596	72,231,995	39,717,399
1930.....	49	112,079,926	9,723	14,934,325	22,765,648	52,588,935	29,823,287

*Figures of materials used are of purchased materials only, and production figures cover sales only.

Table 156.—Principal Statistics of the Pig Iron and Ferro-Alloys, Steel and Rolled Products Industry in Canada, by Provinces, 1929 and 1930

Province	Year	Number of plants	Capital employed	Number of employees	Salaries and wages	Cost of materials	Production	Value added by manufacturing
			\$		\$	\$	\$	\$
Nova Scotia.....	1929	6	28,626,944	2,150	3,352,388	7,789,915	16,044,488	8,254,573
	1930	6	21,508,717	1,974	2,572,564	5,702,836	11,814,234	6,111,398
Quebec.....	1929	13	11,765,863	2,624	3,569,143	2,670,576	10,344,845	7,674,269
	1930	13	16,964,961	2,179	2,999,077	2,288,934	8,190,360	5,901,426
Ontario.....	1929	18	66,941,099	5,915	10,985,718	21,591,863	43,739,532	22,147,669
	1930	19	70,544,399	4,958	8,708,854	14,329,688	30,655,496	16,325,808
Manitoba.....	1929	4	1,884,623	435	501,832	430,804	1,811,930	1,381,126
	1930	4	1,842,849	390	435,597	321,411	1,341,907	1,020,496
Alberta and British Columbia...	1929	4	228,000	94	125,600	31,438	291,200	259,762
	1930	7	1,219,000	222	218,233	122,779	586,938	464,159
Canada.....	1929	45	109,446,529	11,218	18,534,681	32,514,596	72,231,995	39,717,399
	1930	49	112,079,926	9,723	14,934,325	22,765,648	52,588,935	29,823,287

Table 157.—Materials Charged to Iron Blast Furnaces in Canada, 1930

Item	Quantity	Cost at furnace
		\$
Foreign iron ore.....long tons	1,328,929	4,962,212
Mill cinder, scale, slags, etc.....long tons	94,766	293,911
Scrap.....long tons	35,909	354,158
Limestone—		
From Canadian quarries.....short tons	106,919	172,060
From foreign sources.....short tons	294,769	373,897
Coke—		
From Canadian coal.....short tons	253,735	1,486,614
From imported coal.....short tons	468,469	2,498,168
Imported.....short tons	73,836	462,105
Total.....		10,603,125

Table 158.—Production and Sales of Pig Iron in Canada, by Grades, 1930

Item	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Pig Iron—				
Basic.....	494,231	507,431	12,440	227,431
Foundry.....	193,074	2,293	156,211	2,968,842
Malleable.....	59,873	880	46,653	927,289
Total.....	747,178	510,604	215,304	4,123,562

Table 159—Production of Ferro-Alloys in Canada, 1921-1930

	Long tons		Long tons
1921.....	22,608	1926.....	57,060
1922.....	21,602	1927.....	59,230
1923.....	41,887	1928.....	44,482
1924.....	35,034	1929.....	89,116
1925.....	25,709	1930.....	65,223

Table 160.—Materials Used in the Steel Ingots and Castings Industry in Canada, 1930

Item	Unit of measure	Companies' own production	Purchased materials	
			Quantity	Cost at furnace
Metals:—				\$
Pig iron.....	long ton	508,984	11,578	258,314
Spiegeleisen and ferromanganese.....	long ton		9,087	583,103
Ferrosilicon.....	long ton		4,717	252,412
Other ferro-alloys.....	long ton		515	105,732
Metals for making alloy steels (nickel, etc.).....	long ton		431	114,008
Scrap iron or steel, including old rails not intended for re-rolling.....	long ton		333,145	4,365,184
Scrap, made in works reporting.....	long ton	239,905		
Total metals.....				5,678,753
Ores:—				
Crude iron ore:—				
Foreign.....	long ton		58,292	391,188
Calcined, roasted or treated ore—Foreign.....	long ton		13	191
Manganiferous ore:—				
Foreign.....	long ton		2,004	34,050
Canadian.....	long ton		170	8,818
Chrome, etc.,—				
Foreign.....	long ton		744	21,821
Total ores.....	long ton		61,223	456,068
General materials:—				
Limestone—Canadian.....	short ton		38,597	101,306
Foreign.....	short ton		70,522	90,762
Fluorspar.....	short ton		6,486	92,743
Dolomite.....	short ton		12,796	52,367
Coke from Canadian coal.....	short ton		1,829	21,867
Coke made in Canada from imported coal.....	short ton		384	4,723
Imported coke.....	short ton		314	3,703
Anthracite coal.....	short ton		761	6,598
Bituminous coal.....	short ton		150	1,500
Charcoal.....	bushels		84,945	17,271
Carbon electrodes.....				67,726
Other materials.....				488,455
Total general materials.....				949,021
Total value of all metals, ores and general materials.....				7,083,842

Table 161.—Products* of the Steel Ingots and Castings Industry in Canada, 1930

Item	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Steel Ingots:—				
Basic open hearth.....	925,427	926,449	753	22,540
Electric.....	31,461	30,051	1,390	224,941
Direct Steel Castings:—				
Basic.....	24,772	6,391	19,939	3,060,844
Bessemer.....	2,314	86	2,268	463,153
Electric.....	25,604	216	24,213	4,242,229
Total.....	1,009,578	963,143	48,563	8,013,707

*Production figures as given herein do not necessarily represent the total Canadian output; there may be also a small production in other industrial groups.

Table 162.—Materials used in the Rolled Iron and Steel Products Industry in Canada, 1930

Item	Companies' own make	Purchased materials	
		Quantity	Cost at mill
	Long tons	Long tons	\$
Steel, crude and semi-finished (ingots, blooms, billets, slabs).....	1,019,334	67,725	2,697,610
Rails, old or scrap.....		43,731	733,497
Iron muck and scrap bar.....	4,346	245	17,299
Iron and steel scrap.....	6,403		
Axles, scrap.....		3,931	80,327
Other iron and steel.....	3,510		12,202
All other materials.....			109,151
Total.....	1,033,593	115,632	3,659,086

Table 163.—Output of the Rolled Iron and Steel Products Industry in Canada, 1930

Products	Total tonnage made	Tonnage shipped to companies' own plants	Tonnage sold	Income from sales
	Long tons	Long tons	Long tons	\$
Blooms, billets and slabs, (except for forging).....	756,778	690,391	60,171	2,017,747
Rails.....	233,432	212	232,414	10,504,700
Structural shapes.....	32,140	444	29,964	1,521,069
Merchant bars, including rounds, spring steel, squares, flats (6 in. and under), except flats for cold rolling and bars for reinforcing concrete.	164,541	30,366	143,398	7,593,158
Bars for reinforcing concrete.....	63,153	2,243	64,320	3,348,188
Long angle splice bars, long fish plate bars, tie plate bars and all other long rail joint shape bars.....	55,390	56,147		
Spike rods, bolt and nut rods, horseshoe bars, and all other miscellaneous rolled (not forged) forms not elsewhere specified.....	19,844	17,017	2,912	192,718
Wire rods, including chain rods.....	108,992	85,867	24,889	987,405
Railway tie plates.....	42,205	6	43,017	2,359,710
Railway fish plates and angle splice bars.....	12,245	4	13,277	849,507
Forings of iron and steel.....	6,388		6,352	696,610
Railway spikes and pressed spikes.....	10,465	398	11,378	804,780
Washers.....	524	40	573	84,764
Scrap iron and steel.....	4,544	1,305	3,239	32,024
Other products including plain sheets, plates, galvanized sheets, rolled axles, horseshoes, etc., for which figures cannot be shown separately.....				6,002,907
Total.....				36,995,287

Table 164—World Production of Pig Iron, 1928-1930

(Including ferro-alloys)
(Supplied by *Imperial Institute*)
(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	6,610,100	7,589,300	6,192,400
Union of S. Africa.....	8,914	16,249	29,255
Canada.....	1,082,209	1,169,276	812,401
India.....	1,055,117	1,395,171	1,179,568
Australia.....	410,873	(a) 4,393	(a)
New Zealand.....	6,362		8,075
Total.....	9,170,000	10,500,000	8,600,000
FOREIGN COUNTRIES			
Austria.....	451,210	451,724	292,136
Belgium.....	3,796,075	3,976,715	3,312,091
Czechoslovakia.....	1,544,480	1,618,542	1,414,392
Finland.....	8,336	6,504	(a)
France:—			
Saar.....	1,905,606	2,071,695	1,882,240
Other districts.....	9,823,254	10,198,417	9,876,608
Germany.....	11,617,144	13,030,356	9,541,398
Hungary.....	280,953	362,140	253,164
Italy.....	545,362	714,841	578,314
Jugoslavia.....	28,841	32,665	34,558
Luxemburg.....	2,726,312	2,860,195	2,434,666
Netherlands.....	254,146	249,768	268,411
Norway.....	124,599	150,972	142,549
Poland.....	673,149	694,389	470,399
Roumania.....	69,016	71,203	67,756
Russia (years ended Sept. 30).....	3,230,143	3,954,300	5,011,000
Spain.....	553,931	687,448	612,069
Sweden.....	430,602	515,556	488,570
Mexico.....	48,077	59,279	56,913
United States.....	38,155,714	42,613,983	31,752,169
Brazil.....	21,286	(a)	(a)
China (estimated).....	434,000	(a)	(a)
Japan (b).....	1,516,131	1,490,906	1,630,013
Manchuria.....	280,181	289,512	(a)
Korea.....	146,304	153,058	148,987
Philippine Islands.....	200	200	170
Total.....	78,700,000	86,700,000	71,100,000
World's Total.....	87,900,000	97,200,000	79,700,000

(a) Information not available.

(b) Including pig iron produced at government and other steel works for conversion into steel.

Table 165—World Production of Steel Ingots and Castings, 1928-1930

(Supplied by *Imperial Institute*)

(Long tons)

Producing countries	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	8,519,700	9,636,200	7,325,700
Union of South Africa (b).....	31,836	38,269	38,956
Canada.....	1,234,719	1,378,024	1,011,743
India.....	409,710	575,310	618,922
Australia.....	410,031	(a)	(a)
Total.....	10,600,000	12,000,000	9,400,000
FOREIGN COUNTRIES			
Austria.....	636,861	621,952	461,000
Belgium.....	3,872,331	4,044,596	3,301,196
Czechoslovakia.....	1,941,917	2,158,759	1,788,509
France:—			
Saar.....	2,040,309	2,174,022	1,904,237
Other districts.....	9,329,776	9,545,765	9,297,366
Germany.....	14,092,157	15,769,785	11,356,346
Hungary.....	478,584	505,362	363,584
Italy.....	1,928,585	2,088,677	1,715,817
Norway.....	2,823	3,800	3,122
Luxemburg.....	2,526,664	2,659,579	2,234,060
Poland.....	1,415,492	1,354,970	1,218,000
Russia (years ended Sept. 30).....	4,085,832	4,647,900	5,650,000
Spain.....	764,770	987,611	909,932
Sweden.....	567,072	682,959	601,177
Mexico.....	86,535	110,777	111,929
United States.....	51,544,180	56,433,473	40,699,483
Japan.....	1,923,247	2,306,058	2,203,914
China (estimated).....	30,000	30,000	30,000
Total.....	97,300,000	106,100,000	83,800,000
World's Total.....	107,900,000	118,100,000	93,200,000

(a) Information not available.

(b) Including rails, fishplates, etc.

Table 166.—Production of Pig Iron in Canada, by Provinces, 1925-1930

(Long tons)

Year	Nova Scotia	Ontario	Total
1925.....	201,795	368,971	570,766
1926.....	250,238	507,079	757,317
1927.....	249,549	460,148	709,697
1928.....	302,756	734,971	1,037,727
1929.....	310,801	769,359	1,080,160
1930.....	212,636	534,542	747,178

Table 167.—Production of Pig Iron in Canada, by Grades, 1925-1930

(Long tons)

Year	Basic	Foundry	Malleable	Total
1925.....	409,590	101,968	59,208	570,766
1926.....	469,630	243,307	44,380	757,317
1927.....	523,701	145,787	40,209	709,697
1928.....	724,559	233,366	79,782	1,037,727
1929.....	770,478	221,644	88,038	1,080,160
1930.....	494,231	193,074	59,873	747,178

Table 168.—Production of Pig Iron in Canada, by Months, 1927-1930

(Long tons)

Month	1927	1928	1929	1930
January.....	51,717	65,006	87,764	87,079
February.....	50,695	64,691	93,939	70,600
March.....	75,637	78,390	86,176	74,582
April.....	77,240	74,736	79,341	72,359
May.....	78,987	87,811	81,464	80,505
June.....	69,437	97,379	89,873	66,081
July.....	50,997	95,422	99,786	64,676
August.....	63,234	91,522	112,528	57,459
September.....	52,470	90,516	98,816	49,395
October.....	38,097	93,186	91,409	40,079
November.....	37,989	95,426	86,516	46,360
December*.....	63,197	103,642	72,548	38,023
Total.....	709,697	1,037,727	1,080,160	747,178

*Slight errors in monthly production figures have been compensated in December totals.

Table 169.—Production of Steel Ingots and Direct Steel Castings in Canada, by Kinds, 1925-1930

(Long tons)

Year	Steel ingots		Direct steel castings			Total steel ingots and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1925.....	734,277	.....	9,059	1,732	7,435	752,503
1926.....	744,103	.....	19,831	1,676	10,652	776,262
1927.....	868,440	134	17,569	2,191	19,611	907,945
1928.....	1,189,399	602	20,109	2,019	22,590	1,234,719
1929.....	1,295,162	14,444	35,806	2,590	30,022	1,378,024
1930.....	925,427	31,461	24,772	2,314	25,604	1,009,578

Table 170.—Production of Steel Ingots and Castings in Canada, by Months, 1927-1930

(Long tons)

Month	1927	1928	1929	1930
January.....	58,551	84,295	116,260	115,200
February.....	55,620	98,820	117,445	106,612
March.....	107,381	118,258	137,158	117,487
April.....	109,107	112,780	122,102	102,681
May.....	96,711	117,655	126,372	99,312
June.....	59,940	116,530	119,505	95,321
July.....	55,250	82,807	129,827	68,424
August.....	77,479	88,677	120,282	57,626
September.....	54,250	99,888	99,000	55,808
October.....	56,371	108,987	115,674	65,431
November.....	80,730	108,463	93,648	71,740
December*.....	96,555	97,559	80,751	53,936
Total.....	907,945	1,234,719	1,378,024	1,009,578

*Slight errors in monthly production figures have been compensated in December totals.

MAGNESIUM

In the manufacture of metallic magnesium, especially selected calcined magnesite was formerly employed by one American company, but now the metal is made from magnesium chloride, both in the United States and other countries. There is no production of this metal in Canada.

The average price of magnesium metal in 1915 was approximately five dollars per pound, it can now be purchased in carload lots at thirty cents. Magnesium alloys are about one-third lighter than those of aluminium and possess only 25 per cent of the weight of iron or steel. The alloys are strong and lend themselves to many means of working. They can be extruded, welded, drawn, rolled, cast or forged as other metals with which industry is familiar. At the new price, magnesium by volume becomes directly competitive with aluminium. It is being used in ever increasing quantities in the motor, aircraft, radio and other industries.

MANGANESE

In 1930 a few tons of high grade pyrolusite ore were shipped from the dump of a property in Lunenburg county, Nova Scotia; manganese ore was also mined and shipped from a deposit near Turtle creek station, Albert county, New Brunswick, these shipments went to electro metallurgical and steel plants. Five tons of manganese ore were mined during the year on the "Smuggler Group", Birch Island, British Columbia; this ore was extracted for experimental purposes.

The importance of manganese in the manufacture of iron and steel is steadily increasing; a large part of the consumption is in the manufacture of manganese-iron alloys (spiegeleisen and ferromanganese) for the making of special steels.

Chief sources of manganese and the largest known deposits are in Russia (Caucasus), Southern and Central India and East Central Brazil. It also occurs in commercial quantities in several countries of Europe, Canada, the United States, Cuba, Mexico and Australia.

The State of Minas Geraes, Brazil, possesses the largest manganese deposits in the Americas. Ores consist of manganite, pyrolusite and psilomelane, the grade exported contains from 48 to 50 per cent manganese. Ore is found in two series of rocks, one consists of limestone and quartzite and the other an eruptive of Laurentian age. In 1925 ore was mined and delivered to the docks at Rio de Janeiro at a cost not below \$4.59 per ton.

Table 171.—Production of Manganese Ore in Canada, 1886-1930

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	1,789	41,499	1900.....	30	1,800	1913.....		
1887.....	1,245	43,658				1914.....	28	1,120
1888.....	1,801	47,944	1901.....	440	4,820	1915.....	201	9,360
1889.....	1,455	32,737	1902*	172	4,062			
1890.....	1,328	32,550	1903.....	91	2,775	1916.....	957	89,544
			1904.....	66	2,740	1917.....	158	14,836
1891.....	255	6,694	1905.....	22	1,720	1918.....	440	6,230
1892.....	115	10,250				1919.....	661	14,159
1893.....	213	14,578	1906*	93	925	1920.....	649	11,029
1894.....	74	4,180	1907*	1	22			
1895.....	125	8,464	1908.....			1921.....	68	3,400
			1909.....			1922.....	73	2,044
1896*	124	3,975	1910.....			1923.....	200	1,400
1897*	15	1,166				1924.....	534	4,088
1898.....	50	1,600	1911.....	6	300	1925-29.....		
1899.....	1,581	20,004	1912.....	75	1,875	1930.....	273	1,356
						Total.....	15,458	448,904

*Exports.

Table 172.—World Production of Manganese Ore, 1928-1930

(Supplied by *Imperial Institute*)
(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	263		
Gold Coast (exports).....	363,439	457,211	467,589
Northern Rhodesia.....	2,007	2,071	978
Union of South Africa.....		10,306	162,393
Canada (bog ore).....	385	301	276
India.....	1,095,863	1,113,592	929,540
Unfederated Malay States.....	54,900	36,045	23,180
Australia.....	187	351	140
Total.....	1,512,000	1,624,000	1,579,200
FOREIGN COUNTRIES			
Austria (a).....	43,611	43,049	28,197
Czechoslovakia.....	109,611	106,404	93,939
France.....	3,426	1,200	1,547
Germany.....	232	523	2,589
Greece.....	1,191	1,792	6,955
Hungary.....	24,435	20,992	25,428
Italy.....	11,325	10,931	11,721
Jugoslavia.....	2,932	4,955	1,697
Roumania.....	34,466	38,623	36,958
Russia (years ended Sept. 30)—			
Nikopol.....	526,924	674,536	1,728,565
Tchiaturi.....	213,189	710,220	
Urals.....	1,104	616	
Spain.....	15,107	19,701	17,773
Sweden.....	17,406	16,103	9,567
Egypt.....	151,570	211,067	133,613
Morocco (French zone).....	2,568	14,495	(a)
Tunis.....	2,800	1,519	
Cuba (exports).....	95,982	9,408	(a)
Porto Rico (exports).....	1,706	2,594	1,391
Mexico.....	729	(a)	332
United States (c).....	52,483	67,624	75,079
Argentina.....	155	230	264
Brazil.....	352,547	323,327	178,615
Chile.....	10,132	3,422	6,756
China (exports).....	47,766	46,165	60,467
Japan.....	19,503	20,272	(a)
Netherlands East Indies.....	26,954	22,776	(a)
Portuguese India.....	4,590	(a)	(a)
Turkey.....	66	166	1,008
Total.....	1,792,000	2,352,000	2,464,000
World's Total.....	3,248,000	4,032,000	4,032,000

(a) Information not available.

(b) Manganese content of manganese ore and manganiferous iron ore.

(c) Shipments, excluding ore containing 10-35 per cent Mn. which is included with iron ore.

MERCURY

A small amount of mercury was recovered in 1926 from a property on the north shore of Kamloops lake, British Columbia. In 1895, 1896 and 1897 a small production was derived from this same district. During 1930 work was conducted on the Cinnabar King, a mercury deposit located in the Lillooet mining division of the same province.

Cinnabar, the most important ore of mercury, is found in many places throughout the world but the chief producing countries are Italy, Spain and the United States in order of their importance.

Recent uses for mercury include its employment in the construction of neon lights and its adoption in the making of artificial silks. It is also utilized in the manufacture of automatic switches for electrical devices, radio tubes, explosives, storage batteries and as a fertilizer for grass. The mercury boiler is another potential consumer; mercury heated in one boiler is used first like steam to drive a turbine and then exhausted for recovery by condensation.

Table 173.—Production of Mercury in Canada, 1895-1930

Year	Flasks	Price per flask	Value
		\$	\$
1895.....	71	33.00	2,343
1896.....	58	33.44	1,940
1897.....	9	36.00	324
1898-1930.....			

Table 174.—Imports into Canada of Mercury, 1925-1930

Year	Pounds	Value
		\$
1925.....	146,435	118,697
1926.....	100,492	84,910
1927.....	124,099	160,330
1928.....	199,603	269,746
1929.....	346,701	478,048
1930.....	105,755	153,837

Table 175.—Monthly Average Price of Mercury, 1928-1930

(At New York, per flask of 76 pounds)

(From Engineering and Mining World)

Month	1928	1929	1930
	\$	\$	\$
January.....	123.620	119.481	121.192
February.....	121.370	119.818	120.500
March.....	122.557	121.904	118.808
April.....	123.740	122.000	114.000
May.....	123.173	121.154	117.269
June.....	122.423	120.500	118.000
July.....	121.260	121.654	117.462
August.....	124.500	125.111	116.000
September.....	128.000	124.542	113.620
October.....	125.923	124.298	110.596
November.....	123.000	123.323	106.717
December.....	122.500	121.959	105.346
Average.....	123.506	122.145	115.009

Table 176.—World Production of Mercury, 1928-1930

(Supplied by Imperial Institute)

(Pounds)

Country	1928	1929	1930
BRITISH EMPIRE			
New Zealand.....			4,032
FOREIGN COUNTRIES			
Austria.....	14,550	10,041	6,217
Czechoslovakia.....	158,576	144,282	156,570
Italy.....	4,383,495	4,405,431	4,261,281
Russia (years ended Sept. 30).....	224,871	286,600	250,000
Spain.....	4,839,413	5,457,752	4,400,000
Algeria.....		10,415	49
Mexico.....	192,726	182,181	366,499
United States.....	1,358,100	1,799,800	1,638,000
Turkey.....	9,450	17,925	40,875
Japan.....	1,017	3,185	9,208
China (exports).....	150,000	150,000	150,000
Korea.....		718	1,946
World's Total.....	11,300,000	12,500,000	11,300,000

MOLYBDENUM

Molybdenite (MoS_2) deposits are known to occur in Nova Scotia, Quebec, Ontario, Manitoba and British Columbia. The principal production, however, has been from the Moss mine near Quyon in Pontiac county, Quebec.

In 1926 the Moss mine produced 25,168 pounds of molybdenite concentrates containing 20,943 pounds of molybdenum sulphide which, valued at 50 cents a pound, was worth \$10,472. The ore produced was chiefly low-grade material containing less than 2 per cent MoS_2 , some higher grade ore assayed up to 15 per cent MoS_2 .

Molybdenum is employed chiefly in the manufacture of special steels, these are used largely in the automobile industry. High Speed Steel Alloys, Ltd., of Widnes, Lancashire, England, announce that in the case of grey cast iron a transverse strength of nearly 5,000 pounds per square inch is obtainable by the addition of 0.4 per cent molybdenum to iron containing 1.65 per cent silicon and 3.0 per cent carbon in comparison with a maximum transverse strength of about 3,200 pounds per square inch without molybdenum. In electrical furnace work the resistance wire formerly made of platinum is now largely constructed of molybdenum.

The principal producing countries during the last three years have been the United States and Norway. No molybdenite was produced in Canada in 1930. Development operations during the year were carried on at the Tidewater Molybdenite mine, Alice Arm, British Columbia

Table 177.—Production of Molybdenite in Canada, 1902-1930

Year	Ores mined	Ores treated	Ores and concentrates shipped		MoS_2 content of shipments ^a	MoS_2 production (probable recovery)	
	Tons	Tons	Tons	Value (a) \$	Pounds	Pounds	Value (b) \$
1902.....	3	.....	3.3	400	(c)	(c)	(c)
1903.....	600	.....	85.0	1,275	(c)	(c)	(c)
1904-1913.....	.....	.....	.....	.....	.....	.....	.....
1914.....	166	.....	16.5	2,063	3,814	3,814	2,063
1915.....	2,242	216	39.0	28,920	29,210	29,210	28,450
1916.....	13,522	9,100	610.0	188,316	156,461	156,461	156,461
1917.....	26,871	22,605	1,554.3	320,006	330,316	288,705	288,705
1918.....	34,030	33,935	461.3	428,807	378,482	378,029	434,733
1919.....	7,280	6,783	46.0	69,203	83,002	83,002	69,203
1920-1923.....	.....	.....	.....	.....	.....	.....	.....
1924.....	700	668	10.0	9,370	18,739	18,739	9,307
1925.....	3,000	2,779	15.3	11,176	22,350	22,350	11,176
1926.....	4,186	4,490	12.6	10,472	20,943	20,943	10,472
1927.....	.....	.....	.....	.....	.....	.....	.....
1928.....	.....	.....	.....	.....	.....	.....	.....
1929.....	9,100	2,900	9.5	6,400	16,150	16,150	6,400
1930.....	.....	.....	.....	.....	.....	.....	.....

(a) Value as given by the operators.

(b) Estimated at the average market value of molybdenite.

(c) No figures available.

Table 178.—World Production of Molybdenum Ore, 1928-1930

(Supplied by Imperial Institute)

(In cwt—112 pounds, of concentrates)

Country	1928	1929	1930
BRITISH EMPIRE			
Canada (MoS_2).....	.....	144	.....
Australia.....	40	10	105
FOREIGN COUNTRIES			
Austria.....	96	77	5
Italy.....	.....	.....	.....
Norway (MoS_2).....	3,287	3,478	4,193
Russia (years ended Sept. 30).....	33	(a)	(a)
French Morocco (ore).....	21	18	200
United States (sales) (Mo content) (b).....	29,725	34,863	33,565
Korea.....	609	582	520

(a) Information not available.

(b) Estimated.

RADIUM-URANIUM

Since 1923 the Belgian government, through the Union Minière du Haut Katanga, has possessed a practical monopoly of the production and distribution of radium throughout the world. The 1930 report of this company states that the development of the Chinkolobwe mine in the Belgian Congo was continuous throughout the year; this was due to the steady demand for radium. Sales by this company for the year amounted to 60 grammes of radium-element.

Exploratory work was carried out in Canada during 1930 on radium bearing ores in Cardiff township, Haliburton county, Ontario, and a discovery of pitch blende was made at Echo Bay on Great Bear Lake, Northwest Territories. The mineral in these occurrences consists of uraninite (pitchblende) the richest known ore of radium. In the great Bear Lake veins silver is associated with pitchblende along three definite zones of shearing a few hundred feet apart.

Electrolytic methods have now been extended to include the preparation of the rare metals thorium and uranium in the research laboratories of the Westinghouse Lamp Company. Either uranium or thorium metal may be cold rolled, hammered or drawn to almost any extent and are now commercially available in the form of wire or sheet. Both uranium and thorium are radioactive and tend to ionize the gas surrounding them, this property is taken advantage of in constructing electrodes for gas discharge devices where a low initial breakdown voltage is desired.

Table 179.—Production of Uranium Minerals, 1928-1930.

(Supplied by *Imperial Institute*)

(Cwt. 112 pounds)

Country	1928	1929	1930
Czechoslovakia (U ₃ O ₈).....	378	316	259
Germany (Prussia).....	40	14	(a)
Portugal.....	2,815	(a)	(a)
Russia (years ended Sept. 30).....	(a)	(a)	(a)
Madagascar—			
Befafite.....			
Euxenite.....			
United States (U ₃ O ₈).....	(a)	232	(a)

Uranium minerals were produced in the United Kingdom during 1928 and 1929, but figures are not available for publication. They are also produced in the Belgian Congo, but figures are not available—it is, however, reported that the radium produced from these ores was 20 grams, 26 grams, 42 grams, 60 grams and 60 grams in the years 1926 to 1930 respectively.

(a) Information not available.

SELENIUM AND TELLURIUM

In the refining of copper, selenium and tellurium are often found in the slime, combined with silver and copper to form selenides and tellurides. During ordinary furnace treatment part of the selenium is condensed in the flue system or caught in the solutions from Cottrell precipitation. It is recovered by oxidation, leaching, precipitation and finally by distillation. Selenium is generally sold in the form of an amorphous powder approximately 99 per cent pure.

The unique property of selenium is that the electrical resistance is lowered upon exposure to light. This particular property has caused the development of the selenium cell. Other industrial uses of selenium are the flame proofing of switchboard tables; as a vulcanizing and accelerating agent in rubber manufacturing and as a colourizer and colour neutralizer in glass and pottery industries.

Metallic tellurium is used as a crystal detector in radio work, as a colouring agent in certain glass and ceramic ware, as an anti-knock compound for gasoline and in photography.

It is expected that selenium will be produced in 1931 at the new copper refinery now in operation at Copper Cliff, Ontario.

TIN

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The occurrence of tin ore has been reported from several localities, the most important perhaps being the discovery of cassiterite, near New Ross, Lunenburg county, N.S. Reports on this occurrence may be found in the Summary Reports of the Geological Survey Branch of the Department of Mines for 1907, 1908, 1910, 1911 and 1912.

Cassiterite occurs in a few scattered crystals in pegmatite dykes in the drainage basin of McDougal creek, Lardeau division, B.C., and it has been found also in black sands in the Atlin district, B.C., and in the alluvial sands of Dublin gulch, Mayo district, Yukon.

Tin is also found in Sullivan mine ore which is primarily lead and zinc. It has been separated by the Consolidated Mining and Smelting Company, Limited, but up to the present, the work has been only experimental and there has been no commercial production of the metal from this source.

Ores of tin were formerly imported from South America and reduced in Canada by the Electro Tin Products Company at Brantford, Ontario. The plant, which consisted of roasting furnaces, electric smelting and slag-cleaning furnaces, was dismantled some years ago when competition of European smelters treating the easily-reducible tin concentrates from the Malay States, made the operation of the Canadian plant (and several in the United States) unprofitable.

Tin bearing pegmatites of the Winnipeg river area, in Manitoba, received considerable attention during 1929; an appreciable amount of exploratory work was accomplished on the more promising of these occurrences.

The principal tin consuming industries are food packing and automobile manufacturing. Tin-bearing alloys, tinplate clippings, and melting pot drosses are the most important materials from which secondary tin is reclaimed. Most of the tin recovered from alloys does not pass through a refined tin stage but is made into alloys which are brought to the required specifications by the addition of virgin metals.

Table 180.—Imports into Canada of Tin, 1928-1930

	1928		1929		1930	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Tin in blocks, pigs and bars.....	5,358,700	2,822,413	5,714,500	2,670,819	5,273,700	1,757,494
Tin foil.....	102,388	61,127	102,152	55,092	74,470	35,633
Strip waste.....	2,000	40				
Collapsible tubes.....		44,655		49,841		61,464
Tin plated kitchen and dairy hollow-ware, not painted or decorated.....		74,400		81,238		104,010
Manufactures of tin plate, painted, japanned, decorated or not, and manufactures of tin, n.o.p.....		838,204		870,961		936,242
Tin cans and containers.....		518,047		644,075		555,907
Bichloride of tin or tin crystals.....	737,819	229,985	965,236	282,329	785,875	181,704
Total.....		4,588,871		4,654,355		3,632,454

Table 181—World Smelter Production of Tin, 1928-1930.

(Supplied by Imperial Institute)

(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom (estimated).....	56,000	63,840	56,000
British Malaya (b).....	110,699	118,178	108,608
Australia.....	3,509	2,531	1,729
Total.....	170,240	184,800	166,880
FOREIGN COUNTRIES			
Belgium (estimated).....	1,008	1,008	784
France.....	631	568	(a)
Germany.....	5,229	2,944	(a)
Italy.....	124	152	97
Netherlands (estimated).....		1,120	2,240
Portugal.....			
China (exports).....	7,877	7,591	7,261
French Indo-China.....	289	346	365
Japan.....	821	895	1,026
Netherlands East Indies (exports).....	15,639	14,952	16,082
Siam (exports).....	3		
Total.....	31,360	30,240	31,360
World's Total.....	201,600	215,040	198,240

(a) Information not available.

(b) Exports plus or minus difference between "carry over" at end and beginning of the year.

TITANIUM

The minerals rutile and ilmenite constitute the chief ores of titanium, deposits of rutile are mined in Norway and Virginia, U.S.A. Ilmenite, containing rutile, occurs in large deposits north of Baie St. Paul, Quebec. Shipments of titaniferous iron ore have been exported from the district for some years. The 1930 production amounted to 412 tons valued at \$1,239. Titanium in the form of ferrotitanium is employed as a scavenger in steels and cast iron. The demand for purified titanium oxide, or titanium white continues to increase; used as a pigment it is superior in many respects to zinc oxide, lithopone and white lead.

A process utilizing titanium ores, such as ilmenite, was developed in the Hydrometallurgical Laboratory of the Mines Branch, Ottawa. In this process the iron content was ultimately recovered as electrolytic iron and the titanium as a concentrate of TiO_2 suitable for pigment manufacture. In 1930, 16,051,513 pounds of lithopone were imported into Canada; there is at present no Canadian production of titanium white.

TUNGSTEN

Tungsten ores are found in widely separated districts in the Dominion, minerals containing this metal have been found in the provinces of Nova Scotia, New Brunswick, Manitoba and British Columbia. The deposits in Nova Scotia and New Brunswick appear to possess the greatest economic possibilities. During 1930 prospecting was carried on at the Romilly Scheelite mine, Waverley, Halifax county, Nova Scotia.

The only important productions (1) of tungsten ore reported in Canada are the following: in 1912 there was a shipment of 14 tons of concentrates produced by the Scheelite Mines Ltd., of Moose River, N.S., a small test shipment of a few hundred pounds was made from Halifax county, Nova Scotia, and another from Dublin Gulch, Mayo district, Yukon Territory, in 1917. These amounted in all to 580 pounds and contained 69.41 per cent WO_3 , the shipments netted \$234.

Production in 1918 amounted to 13.5 tons valued at \$11,700 and represented a content of 19.915 pounds of WO_3 . This output, consisting of 11 tons of concentrates, was shipped to New York by the Acadia Tungsten Mines, Ltd., operating at Burnt Hill, N.B., a few small consignments, in the same year, were made to the Mines Branch testing plant, Ottawa, from Nova Scotia, Manitoba, and the Mayo district, Yukon.

China, during recent years, has been the greatest producer of tungsten, the production from that country amounting to about 50 per cent of the world's output of tungsten ores. Burma, Bolivia, Portugal and the United States are, next to China, the principal tungsten producing countries of the world.

Tungsten is employed in the manufacture of alloy steels, electric light filaments, tools and many other metal products. New cutting tools composed of tungsten carbide cemented with cobalt have attracted world wide attention; tungsten carbide tools possess a much longer life than the ordinary high-speed tool steels.

(1) Mines Branch report.

Table 182.—World Production of Tungsten Ore and Concentrates, 1928-1930

(Supplied by Imperial Institute)

(Short Tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom—			
Tungsten ore.....	108	30	143
Content (WO ₃).....	64	18	101
Southern Rhodesia—			
Tungsten ore.....	15	29	39
India—			
Tungsten ore.....	697	1,510	2,746
Tin-tungsten ore.....	244		
Federated Malay States—			
Wolfram.....	6	49	73
Scheelite.....		308	878
Unfederated Malay States—			
Wolfram.....	69	130	218
Australia—			
Wolfram.....	227	236	225
Scheelite.....		10	7
New Zealand—			
Tungsten ore.....	7	26	27
FOREIGN COUNTRIES			
Czechoslovakia—			
Tin-tungsten ore (WO ₃) content.....	48	49	49
France—			
Tin-tungsten ore (WO ₃) content.....		10	
Portugal—			
Wolfram.....	153	385	520
Tin-tungsten ores.....	2	7	
Russia (years ended Sept. 30)—			
Wolfram.....	19	(a)	(a)
Scheelite.....	44	(a)	(a)
Spain—			
Wolfram.....	208	281	231
Content (WO ₃).....	138	169	150
Mexico—			
Tungsten ore.....		11	28
United States—			
Concentrates (60% WO ₃).....	1,208	830	702
Argentina—			
Tungsten ore.....	26	65	101
Bolivia—			
Tungsten concentrates (export).....	31	1,680	(a)
Content (Tungsten).....	19	1,077	(a)
China—			
Tungsten ore (exports).....	8,116	9,776	9,620
French Indo-China—			
Tin-Tungsten ores (WO ₃) content.....	115	131	146
Japan—			
Tungsten ore.....	55	62	82
Korea—			
Tungsten ores (60% WO ₃).....	161	16	12
Netherlands East Indies—			
Tungsten ore.....	9	11	15
Siam (exports)—			
Tungsten ore.....		63	8

(a) Information not available.

VANADIUM

Vanadium production during 1930, as in preceding years, was practically restricted to the ores from Minasragra, Peru; the oxidized metallic minerals from Broken Hill, Northern Rhodesia and from the vicinity of Oturu, South West Africa; and the Roscoelite and related minerals of Western Colorado and Southeastern Utah. At the end of 1930 Broken Hill Development Co. (Ltd.), which has descloisite and vanadinite in connection with a large zinc deposit in Northern Rhodesia, had its plant for the production of ferrovandium in operation. The annual capacity is said to be 570 tons of ferrovandium containing 34 per cent vanadium.

In Canada vanadium occurs in association with magnetite in deposits in Ontario located in the eastern part of the province and the Rainy River district.

Vanadium is used for the making of tough steels and the United States Bureau of Mines state that its use would undoubtedly increase much faster if the price could be lowered.

Table 183.—World Production of Vanadium Ores, 1928-1930

(Supplied by *Imperial Institute*)

(Short tons)

Country	1928	1929	1930
BRITISH EMPIRE			
North Rhodesia (V content).....	57	57	62
South West Africa.....	5,637	3,400	4,996
FOREIGN COUNTRIES			
Mexico (V ₂ O ₅ content).....	3	1	.....
United States (V content).....	(a)	(a)	(a)
Peru (V content).....	81	995	493
France.....	40	50	70

(a) Information not available for publication.

CHAPTER SIX

THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

An increase in the production of Canadian ores containing the non-ferrous metals has stimulated an expansion in the domestic smelting and refining of these metals. Abundant water power, conveniently located in regard to the mining districts, has made possible the generation of electric energy at such low cost that the utilization of electrochemical or electrothermic processes has been adopted for many metallurgical purposes. Some of the more important of these applications include the electrolysis of alumina and the production of aluminium in various forms in Quebec, the refining of nickel and copper in central Ontario and the manufacture of refined zinc in Manitoba and British Columbia. Electrolytic lead is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company. Electric furnaces are also used throughout the world in the production of abrasives, ferro-alloys, titanium products, magnesium, beryllium, iron, ferrosilicon, carbides and cyanamide.

As a source of power, electric energy is being used to an ever increasing extent in mining and milling operations where important economies in operation are being effected.

In the extraction and treatment of ores, the mining and milling are so closely associated that it is impossible to make a separation of the statistics of these two operations. There is less difficulty in drawing a line between mining and milling on the one hand, and smelting and refining on the other, though there are cases where mining, milling and smelting operations are so closely related that it is not feasible to separate the figures on capital employed. In cases such as these the figures on capital employed have been included with the smelting industry. This chapter is devoted to a consideration of the smelting and refining industry in Canada as it applies to the ores of the non-ferrous metals.

The 13 plants operated by 10 companies in this group in 1930 were as follows: 1 plant at Arvida and 1 plant at Shawinigan Falls, Quebec, both operated by the Aluminium Company of Canada, Ltd.; the smelter at Rouyn, Quebec, operated by the Noranda Mines, Ltd.; the nickel smelters at Coniston, and Copper Cliff and the refinery at Port Colborne, Ontario, operated by the International Nickel Company of Canada, Ltd., the Falconbridge Nickel Mines smelter at Falconbridge, a new electrolytic copper refinery at Copper Cliff, owned by the Ontario Refining Company; the smelter and hydrometallurgical works of the Deloro Smelting and Refining Company at Deloro, Ontario; the smelter of the Kingdon Mining, Smelting and Manufacturing Company, Ltd., near Galletta, Ontario; a new zinc refinery and copper smelter operated by the Hudson Bay Mining and Smelting Co., Ltd., at Flin Flon, Manitoba; the smelter, lead and zinc refineries, precious metals refinery and copper refinery of the Consolidated Mining and Smelting Company at Tadanae, near Trail, B.C.; and the smelter of the Granby Consolidated Mining, Smelting and Power Company, Ltd., at Anyox, B.C.

In Quebec the Aluminium Company of Canada, Limited, operated both their Shawinigan and Arvida plants continuously throughout the year. Alumina, manufactured from foreign bauxite ores is utilized in the production of metallic aluminium by an electrolytic process. Four of the largest waterwheel generators in the world are being installed at the Chute a Caron plants of the Alcoa Power Company. It is reported that the total production of these generators will be 308,000 h.p. or more than the combined developed water power of Alberta, Saskatchewan and New Brunswick. This power is to be used in the production of aluminium.

Sales and production of blister copper by the Noranda Mines Ltd., Rouyn, Quebec, were considerably in excess of 1929. The smelter received from the mine 422,155 tons of direct smelting sulphide ore averaging 7.22 per cent copper, 0.77 ounces of silver, and \$3.30 in gold per ton; also 252,797 tons of silicious ore, used as a flux, of an average grade of 1.30 per cent copper, 0.27 ounces silver, and \$2.94 in gold per ton; the concentrator treated 174,351 tons of an average grade of 2.35 per cent copper, 0.41 ounces silver, and \$3.40 in gold per ton; 733,971 tons of silicious fluxing ore and concentrates treated by the smelter yielded 76,142,246 pounds of blister copper.

A new plant of the Canadian Copper Refiners, Ltd., a joint enterprise of Noranda Mines, Ltd., the British Metal Corporation, and the Nichols Copper Co. of New York, is nearing com-

pletion at Montreal East. The refinery is designed to produce 75,000 tons of electrolytic copper annually; blister copper from Noranda and other sources will be treated here. This refining company has also acquired a considerable financial interest in the Canada Wire and Cable Company, this subsidiary is erecting a rod mill and wire drawing plant near the copper refinery.

Ontario has four smelters and two refineries in operation. At Copper Cliff the new smelter of the International Nickel Company, Limited, was blown in on July 1st and demonstrated an increased efficiency each successive month; a substantial saving in fuel alone justified the change in smelting practice from blast furnace to reverberatory. The concentrator and smelter handled 1,472,782 tons of ore and produced 106,194 tons of bessemer matte during 1930.

Coniston nickel smelter with a new sintering unit continued to show favourable results. In 1930 this plant smelted 812,345 tons of ore and produced 57,879 tons of bessemer matte. On October 1 the Port Colborne refinery curtailed its output in conformity to a lessened demand for nickel; at this plant the platinum metals contained in Frood and Garson ores are recovered as by-products in the electrolytic refining of nickel and are shipped in the form of concentrates by the International Nickel Company to the Acton plant in England for refining. During the year a semi-finished material (nickel sulphides) of high nickel content was produced at Port Colborne to replace the bessemer matte formerly refined in Clydach, Wales. By this new method, copper is extracted and produced as electrolytic copper in Canada rather than as copper sulphate in Wales. A new research laboratory has been completed at Bayonne, New Jersey, by the International Nickel Company, this affords facilities for the present extensive research programme in connection with the development of new markets for nickel, nickel alloys and the platinum metals. Nitre cake and sulphuric acid are now being regularly produced at the works of the Canadian Industries Limited; this plant was recently completed at Copper Cliff and manufactures sulphuric acid from gases purchased from the Copper Cliff smelter.

The new electrolytic copper refinery of the Ontario Refining Company, Limited, Copper Cliff, was successfully placed in operation in mid-year, later producing 6,000 tons of refined copper per month from blister made at the Granby smelter in British Columbia and the International Nickel Company's plants in Ontario. Gold and silver contained in ores from the Frood and Garson mines are recovered at this plant.

Falconbridge Nickel Mines' new smelter near Sudbury, Ontario, was blown in on February 4, 1930. It treated 71,626 tons of ore of an average grade of 2.47 per cent nickel and 1.08 per cent copper; during the period of operation 2,630 tons of matte were produced and shipped to the Kristiansand refinery in Norway. This matte contained 1,514.75 short tons of nickel, 655.97 short tons of copper and an indeterminate amount of precious metals.

At Galetta, Ontario, the Kingdon Mining, Smelting and Manufacturing Company, Ltd., produced pig lead from the Kingdon mine galena concentrates.

Cobalt-silver ores and concentrates, from Cobalt, South Lorrain, and Gowganda districts, were treated in the plant of the Deloro Smelting and Refining Company, Ltd., Deloro, Ontario. Production from this refinery included fine silver, metallic cobalt, cobalt oxides, nickel oxides, nickel salts, white arsenic, cobalt alloys and a silver-lead-bismuth bullion.

In 1930, Manitoba became for the first time, one of the copper smelting and zinc refining provinces of the Dominion. Complete metallurgical plants capable of producing 2,500,000 pounds of blister copper monthly and 50,000,000 pounds of zinc annually have been erected and placed in operation at Flin Flon by the Hudson Bay Mining and Smelting Company. Blister copper was shipped during the latter part of the year to United States refiners and electrolytic zinc was sold on both domestic and foreign markets. A hydro-electric plant of 40,000 h.p. capacity has been fully developed by this company at Island Falls.

Metallurgical industries in British Columbia were affected adversely by the depressed metal prices prevailing during 1930. The large Trail works of the Consolidated Mining and Smelting Company, Limited, produced gold, silver, refined lead and zinc, refined copper, copper matte, cadmium, platinum and palladium; both custom ores and tonnage from their own deposits were treated. During 1930 lead and zinc recoveries by slag fuming were introduced at the Trail works, this salvage treatment recovers 85 per cent of the zinc and practically all the lead contained in blast furnace slag. The Granby Consolidated Mining, Smelting and Power Company's production of blister copper from the Anyox smelter was considerably less than in 1929; this output was shipped to both United States and Canadian refineries.

Table 184.—Ores, Concentrates and Residues Smelted and Value of Smelter and Refinery Products in the Non-Ferrous Smelting and Refining Industry, 1929 and 1930

	1929	1930
	\$	\$
Materials used— Ores, concentrates, residues, etc. (estimated value).....	41,416,446	45,310,472
Products sold— Gold, silver, platinum metals, blister copper, refined copper, lead, zinc, nickel, nickel-copper matte, nickel oxide, nickel salts, cobalt, cobalt oxide, speiss residues, aluminium, base bullion, cadmium and bismuth.....	109,854,468	100,946,136

Table 185.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY— Lands, buildings, plants, machinery and tools.....	94,587,504	121,869,072
Materials on hand, supplies, finished products, ore in storage.....	21,922,933	29,419,783
Cash, trading and operating accounts, bills receivable.....	30,188,648	23,721,831
Total	146,699,085	175,010,686

Table 186.—Employees, Salaries and Wages in the Non-Ferrous Smelting and Refining Industry in Canada, 1929 and 1930

	1929		1930	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried Employees— Total.....	Male 621 Female 63	1,753,840	Male 690 Female 98	2,009,895
Wage-Earners—				
January.....	6,908	12,018,553	7,778	11,786,229
February.....	6,974		7,856	
March.....	6,875		7,800	
April.....	7,046		7,666	
May.....	7,263		7,743	
June.....	7,446		7,832	
July.....	7,717		7,836	
August.....	7,637		7,747	
September.....	7,475		8,046	
October.....	7,931		7,778	
November.....	8,005		7,164	
December.....	7,777		7,042	
*Average.....	7,435	7,838
Total	8,119	13,772,393	8,626	13,796,124

* See note page 37.

CHAPTER SEVEN

**THE COAL MINING, COKE, NATURAL GAS, PEAT AND PETROLEUM INDUSTRIES
(Fuels) IN CANADA**

The Coal Mining Industry in Canada

1. General Review
2. Commodity Statistics on Coal—including Tables on Output, Disposition, Shipments, Tonnage Lost, Imports into Canada and Exports, Consumption and World Output

The Coke and Gas Industry in Canada

The Peat Industry in Canada

The Petroleum Industry in Canada

1. Production of Crude Petroleum
2. Production of Petroleum Products

NOTE.—In order to correlate data, regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information in detail regarding these industries as a whole, dealing principally with the mineral industry although supplementary data are shown for closely allied manufacturing operations.

THE COAL MINING INDUSTRY

Canada's coal production in 1930 declined 14.95 per cent in quantity and 16.2 in value to 14,881,324 tons worth \$52,849,748 as compared with the 1929 total of 17,496,557 tons valued at \$63,065,170. The decline was general in all coal-producing provinces; Nova Scotia's output showed a falling off of 11.4 per cent; New Brunswick's, 4.3 per cent; Saskatchewan's, 0.1 per cent, Alberta's 19.5 per cent, and British Columbia's, 16.3 per cent.

Interprovincial shipments of Canadian coal assume large proportions each year. During 1930, Nova Scotia mines supplied the New Brunswick market with 443,111 tons of coal, Prince Edward Island with 87,788 tons and Quebec with 1,893,679 tons. New Brunswick operators made minor shipments to Prince Edward Island and Quebec. Saskatchewan mines shipped 223,552 tons to Manitoba, 1,535 tons to Alberta and 1,388 tons to Ontario. Alberta shipments included 1,225,274 tons to Saskatchewan points, 226,941 tons to British Columbia, 540,895 tons to Manitoba, 30,217 tons to Ontario and 32 tons to Quebec. British Columbia shipped 34,444 tons to Alberta, 65,845 tons to Saskatchewan, 11,419 tons to Manitoba, and 107 tons to Ontario.

Railroads supplied an important outlet for Canadian coal in 1930, with total purchases amounting to 4,085,228 tons or 30.37 per cent of the Canadian shipments as against 5,210,989 tons or 32.9 per cent of the total mine shipments in 1929.

Coal mines in operation during 1930 suffered a total loss in output of 6,523,251 tons due to lack of orders, mine disability, absenteeism, car shortage and other causes. In addition, it is estimated that labour disputes at the mines, which involved 6,228 men with a consequent loss in working time of 24,183 man-days were responsible for a further loss of 59,200 tons. Active mines in Nova Scotia produced 72 per cent of their possible output; in New Brunswick, 74 per cent; in Saskatchewan, 64 per cent; in Alberta, 66 per cent; and in British Columbia, 73 per cent.

Canadian coal exported in 1930 declined to 624,512 tons; the lowest point on record since 1888. Exports from Nova Scotia declined slightly while those from British Columbia showed a decrease of 47.73 per cent. Coal cleared through ports in these two provinces accounted for 94.43 per cent of the total Canadian external shipments.

Imports of anthracite, bituminous and lignite coal into Canada during 1930 totalled 17,620,074 tons, or 5.37 per cent below the 1929 total of 18,619,300 tons. The United States is the principal source of Canada's imports of coal. In 1930 receipts of American coal amounted to 16,173,706 tons, including 2,955,954 tons of anthracite, 13,199,076 tons of bituminous, and 18,676 tons of lignite. Importations from Great Britain continued on a large scale, totalling 1,142,326 tons made up of 996,127 tons of anthracite and 146,199 tons of bituminous. Imports

of anthracite coal from Russia advanced 148 per cent in 1930 to a total of 291,407 tons. Canada's coal supply was further supplemented by small importations from Germany, French Indo-China, and Newfoundland.

Canadian coal mines furnished employment to 29,172 employees during 1930. In Nova Scotia and New Brunswick an average of 14,526 employees worked in or about the coal mines; in Western Canada employment was at a much lower level than in 1929. An average of 250 days work was furnished surface employees while underground men worked 210 days; in the preceding year the averages were—surface, 275 days and underground, 246. Salaries and wages paid during 1930 totalled \$36,442,361 as compared with \$42,376,378 in 1929 and \$43,320,811 in 1928.

Labour statistics show that this industry supplied 6,076,684 man-days work during the year as compared with 7,117,692 man-days in 1929 and 7,167,010 man-days in 1928. The computed average daily earning power per man was \$5.47 in 1930; in 1929 the average was \$5.49 and in 1928 it was \$5.57.

Fixed and current assets of the companies operating in the coal mining industry in Canada during 1930 were reported at \$140,316,395. Fuel used at the mines for power purposes was valued at \$2,685,068 and consisted principally of bituminous, sub-bituminous and lignite coal, although small quantities of gasoline, kerosene and wood were also used. The consumption of electricity during the year increased 13.2 per cent and included 74,054,109 k.w.h. purchased at a cost of \$910,348 and 94,972,298 k.w.h. generated by the operating companies for their own use. In addition, 16,069,530 k.w.h. were produced and sold for use apart from coal mining operations.

Domestic and industrial consumers in Canada used large quantities of coke, manufactured and natural gas, fuel oil and electricity, in addition to the 31.88 million tons of coal consumed in 1930. Coke production during the year totalled 2,385,994 tons, of which quantity 1,130,280 tons were sold. Exports of coke amounted to 29,801 tons while imports reached a total of 1,061,040 tons. The apparent consumption of coke in Canada was 3,417,233 tons as against 3,879,226 tons in 1929. The coal equivalent of the coke imported in 1930 was 1,632,368 tons. Canadian coal used at the collieries for the manufacture of coke amounted to 109,955 tons in 1930; in the previous year 115,482 tons were used.

Sales of manufactured gas in Canada are steadily increasing and the 1930 records show 17,713,477 thousand cubic feet sold for domestic and industrial use as compared with 17,649,371 thousand cubic feet in 1929. Natural gas consumption is also on the upward trend; approximately 18,000,000 thousand cubic feet were used for domestic purposes in 1930 and 11,000,000 thousand cubic feet for industrial use. The domestic consumption represented an estimated displacement of 720,000 tons of coal.

Fuel oil consumption for various industrial and domestic purposes amounted to 513 million imperial gallons in 1930 as against 516 million imperial gallons in 1929. The Dominion Fuel Board survey of domestic fuel consumption in 1929 showed a total distribution of 38,753,000 imperial gallons of fuel oil for domestic heating in Quebec and Ontario. A possible coal displacement of 310,000 tons is indicated by this fuel oil consumption.

Table 187.—Capital Employed in the Coal Mines of Canada, by Provinces, as at December 15, 1929 and 1930

Province	1929				1930			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	46,662,239	4,560,401	4,582,887	55,805,527	46,449,139	3,727,540	5,906,656	56,083,335
New Brunswick...	1,452,893	24,243	179,527	1,656,663	1,390,495	24,900	227,008	1,642,403
Saskatchewan.....	3,749,528	83,339	163,851	3,996,718	4,113,672	120,979	123,199	4,357,850
Alberta.....	47,031,532	1,072,587	7,968,965	56,073,084	45,452,048	1,070,620	7,444,514	53,967,182
British Columbia..	21,262,840	663,795	2,105,100	24,031,735	21,420,210	581,531	2,060,884	24,062,625
Yukon.....	203,000	.....	.....	203,000	203,000	.....	.....	203,000
Canada.....	120,362,032	6,404,365	15,000,330	141,766,727	119,028,564	5,525,570	15,762,261	140,316,395

Table 188.—Employees, Salaries and Wages in the Coal Mines of Canada, by Provinces, 1930

Province	Average number of employees				Salaries and wages			
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Surface	Under-ground				
						\$	\$	\$
Nova Scotia.....	470	67	2,291	11,085	13,913	1,005,979	17,126,422	18,132,401
New Brunswick.....	23	6	125	459	613	56,487	514,119	570,606
Saskatchewan.....	45	5	140	389	579	96,360	449,669	546,029
Alberta.....	559	35	2,279	6,570	9,443	1,408,660	10,067,115	11,475,775
British Columbia.....	238	20	1,270	3,093	4,621	617,697	5,097,632	5,715,329
Yukon.....			1	2	3		2,221	2,221
Canada.....	1,335	133	6,106	21,598	29,172	3,185,183	33,257,178	36,442,361

Table 189.—Wage-Earners in the Coal Mines of Canada by Months and by Provinces, 1929 and 1930

Month and year	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Yukon	Canada
January.....1929	12,906	674	711	11,174	4,995		30,460
1930	13,328	617	723	11,060	5,141		30,869
February.....1929	12,665	698	691	11,098	4,953		30,105
1930	13,202	625	631	9,784	5,056		29,298
March.....1929	12,400	666	592	9,212	5,105		27,975
1930	13,183	601	521	8,616	4,197		27,118
April.....1929	12,578	560	413	7,610	4,946		26,107
1930	13,325	592	364	6,617	4,178		25,076
May.....1929	12,700	533	373	7,230	4,365		25,201
1930	13,366	555	338	6,299	4,149		24,707
June.....1929	12,824	533	368	7,707	4,285	3	25,720
1930	13,318	553	312	6,496	4,153	3	24,835
July.....1929	12,629	530	375	8,053	4,370	3	25,960
1930	13,225	566	329	6,800	4,164	3	25,087
August.....1929	12,559	544	391	8,689	4,445	3	26,631
1930	13,205	553	382	7,702	4,206	3	26,051
September.....1929	12,850	515	614	9,902	4,871	3	28,755
1930	13,431	563	545	9,323	4,033	3	27,898
October.....1929	12,936	538	732	10,989	5,041		30,236
1930	13,561	589	777	10,946	4,324		30,197
November.....1929	12,989	558	737	11,239	5,047		30,570
1930	13,630	575	740	11,339	4,366		30,650
December.....1929	13,082	583	734	11,507	5,067		30,973
1930	13,742	626	703	11,203	4,387		30,661
Average.....1929	12,760	578	561	9,534	4,791	3	28,227
1930	13,376	584	529	8,849	4,363	3	27,704

Table 190.—Wage-Earners Employed, Days' Work Done by Months in the Coal Mines of Canada, 1930, with Comparative Totals for 1929

Month	Number of wage-earners			Days' work done		
	Surface	Under-ground	Total	Surface	Under-ground	Total
January.....	6,717	24,152	30,869	156,655	489,569	646,224
February.....	6,434	22,864	29,298	126,919	371,366	498,285
March.....	5,980	21,138	27,118	121,901	356,891	478,792
April.....	5,644	19,432	25,076	108,850	301,246	410,096
May.....	5,483	19,224	24,707	116,216	357,342	473,558
June.....	5,601	19,234	24,835	116,038	351,877	467,915
July.....	5,692	19,395	25,087	114,455	341,763	456,218
August.....	5,878	20,173	26,051	118,652	345,267	463,919
September.....	6,147	21,751	27,898	128,007	373,307	501,314
October.....	6,595	23,602	30,197	155,130	479,910	635,040
November.....	6,564	24,086	30,650	136,405	397,678	534,083
December.....	6,542	24,119	30,661	130,374	380,866	511,240
Total for 1930.....				1,529,602	4,547,082	6,076,684
Total for 1929.....				1,736,276	5,381,416	7,117,692

Table 191.—Wage-Earners Employed in the Coal Mines of Canada, by Classes and by Provinces, 1930, with Comparative Totals for 1929

Classification	Province						Canada		
	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Yukon	Surface	Under-ground	Total
SURFACE—									
Administration.....	76	13	10	94	21		188	26	214
Foremen and clerks.....	154	16	19	220	105		497	17	514
Screenmen and loaders.....	686	32	37	731	142		1,585	43	1,628
Stripping shovel.....			3				3		3
UNDERGROUND—									
Officials.....	530	4	7	326	147		9	1,005	1,014
Hand cutters and helpers.....	1,367	378	224	2,140	1,348	2		5,459	5,459
Machine cutters.....	1,597	6	21	429	83			2,136	2,136
Machine loaders and helpers.....	1,454	18	42	1,733	174			3,421	3,421
Horse haulage employees.....	683	1	46	602	330		39	1,623	1,662
Mechanical haulage employees.....	1,667	8	16	373	310		92	2,282	2,374
Ventilation employees.....	280		1	82	33		4	392	396
Roadmakers.....	288	7	19	183	71		12	556	568
Timbermen.....	995	22	8	265	184		20	1,454	1,474
Pumpmen.....	116	1	7	46	28		7	191	198
Loading shovel.....			1				1		1
MISCELLANEOUS—									
Enginemen.....	189	11	10	161	76		437	10	447
Firemen.....	138	3	14	113	57		325		325
Machinists.....	200	2	2	83	61		339	9	348
Carpenters and masons.....	119	3	8	66	79		274	1	275
Other mechanics.....	296	1	6	106	111		279	241	520
Japanese.....					53		1	52	53
Chinese.....					286		180	106	286
Indians.....					18		17	1	18
All other employees.....	2,541	58	28	1,096	646	1	1,797	2,573	4,370
Total for 1930.....	13,376	584	529	8,849	4,363	3	6,106	21,598	27,704
Total for 1929.....	12,760	578	561	9,534	4,791	3	6,323	21,904	28,227

Table 192.—Output of Coal from Canadian Mines, 1785-1930

Year	Short tons	Value	Average per ton	Year	Short tons	Value	Average per ton
		\$				\$	
1785-1866.....	2,863,826	4,905,462	1.71	1899.....	4,925,051	10,283,497	2.09
1867.....	631,320	1,056,725	1.67	1900.....	5,777,319	13,742,178	2.38
1868.....	623,392	1,073,061	1.72	1901.....	6,486,325	12,699,243	1.96
1869.....	687,825	1,155,282	1.68	1902.....	7,466,681	15,210,877	2.04
1870.....	752,635	1,243,139	1.65	1903.....	7,960,364	15,942,833	2.00
1871.....	3,033,152	5,073,331	1.67	1904.....	8,254,595	16,592,231	2.01
1872.....				1905.....	8,667,948	17,520,263	2.02
1873.....				1906.....	9,762,601	19,732,019	2.02
1874.....	1,063,742	1,763,423	1.66	1907.....	10,511,426	24,381,842	2.32
1875.....	1,039,974	1,747,016	1.68	1908.....	10,886,311	25,194,573	2.31
1876.....	994,762	1,729,546	1.74	1909.....	10,501,475	24,781,236	2.36
1877.....	1,036,670	1,794,415	1.73	1910.....	12,909,152	30,909,779	2.39
1878.....	1,089,744	1,941,285	1.78	1911.....	11,323,388	26,467,646	2.34
1879.....	1,126,497	2,050,639	1.82	1912.....	14,512,829	36,019,044	2.48
1880.....	1,482,714	2,657,194	1.79	1913.....	15,012,178	37,334,940	2.49
1881.....	1,537,106	2,688,821	1.75	1914.....	13,637,529	33,471,801	2.45
1882.....	1,848,148	3,248,446	1.76	1915.....	13,267,023	32,111,182	2.42
1883.....	1,818,684	3,109,635	1.71	1916.....	14,483,395	38,817,481	2.68
1884.....	1,984,959	3,593,831	1.81	1917.....	14,046,759	43,199,831	3.08
1885.....	1,920,977	3,417,807	1.78	1918.....	14,977,926	55,192,896	3.68
1886.....	2,116,653	3,739,840	1.77	1919*.....	13,919,096	55,622,670	3.99
1887.....	2,429,330	4,388,206	1.81	1920*.....	16,946,764	82,496,538	4.86
1888.....	2,602,552	4,674,140	1.80	1921*.....	15,057,493	72,451,656	4.81
1889.....	2,658,303	4,894,287	1.84	1922*.....	15,157,431	65,518,497	4.32
1890.....	3,084,682	5,676,247	1.84	1923*.....	16,990,571	72,058,986	4.24
1891.....	3,577,749	7,019,425	1.96	1924*.....	13,638,197	53,593,988	3.93
1892.....	3,287,745	6,363,757	1.94	1925*.....	13,134,968	49,261,951	3.75
1893.....	3,783,499	7,359,080	1.95	1926*.....	16,478,131	59,875,094	3.63
1894.....	3,847,070	7,429,468	1.93	1927*.....	17,426,861	61,867,463	3.55
1895.....	3,478,344	6,739,153	1.94	1928*.....	17,564,293	63,757,833	3.66
1896.....	3,745,716	7,226,462	1.93	1929*.....	17,496,557	63,065,17	3.60
1897.....	3,786,107	7,303,597	1.93	1930.....	14,813,324	52,849,748	3.55
1898.....	4,173,108	8,224,288	1.97				
Total.....				472,168,946 1/4 7,311,94.....			

*For the years 1919-1930 the tonnage shown is the total output from all mines; for previous years the tonnage shown includes only sales, colliery consumption, and coal used by the operators.

Table 193.—Output and Value of Coal in Canada by Kinds and by Provinces, 1929 and 1930

(Short tons)

Province	1929			1930		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
			\$			\$
NOVA SCOTIA (Bituminous).....	36	7,056,133	28,071,956	36	6,252,552	24,528,860
NEW BRUNSWICK (Bituminous).....	11	218,706	909,169	15	209,349	864,118
SASKATCHEWAN (Lignite).....	58	580,189	993,226	57	579,424	968,863
ALBERTA—						
Bituminous.....	17	3,094,147	10,851,499	17	2,278,467	7,971,401
Sub-bituminous.....	19	668,702	1,908,954	22	603,358	1,705,236
Lignite.....	245	3,387,844	10,167,729	254	2,873,703	8,386,588
Total.....	281	7,150,693	22,928,182	293	5,755,528	18,063,225
BRITISH COLUMBIA (Bituminous).....	26	2,490,378	10,160,789	28	2,083,818	8,421,572
YUKON (Bituminous).....	1	458	1,848	1	653	3,110
CANADA—						
Bituminous.....	91	12,859,822	49,995,261	97	10,824,839	41,789,061
Sub-bituminous.....	19	668,702	1,908,954	22	603,358	1,705,236
Lignite.....	303	3,968,033	11,160,955	311	3,453,127	9,355,451
Total.....	413	17,496,557	63,065,170	430	14,881,324	52,849,748

Table 194.—Disposition of Coal from Canadian Mines, 1929 and 1930

	1929			1930		
	Total coal	Total value	Average value per ton	Total coal	Total value	Average value per ton
		\$	\$		\$	\$
Supplied to employees for domestic consumption.....	204,581	707,280	3.46	189,684	670,882	3.54
Used for power purposes—						
(a) Shops.....	108,509	392,114	3.61	103,269	350,910	3.40
(b) Colliery boilers.....	795,663	2,379,147	2.99	704,437	2,043,076	2.90
(c) Companies' railroads.....	75,704	300,144	3.96	72,807	275,296	3.78
(d) Harbour tugs and dredges.....	724	2,966	4.10			
Shipped—(see table 197)						
(a) Ships' bunkers.....	365,422	58,272,666	3.68	333,687	48,730,804	3.62
(b) Railroads.....	5,210,989			4,085,228		
(c) Other.....	10,247,724			9,032,933		
Used in making coke at colliery.....	115,482	409,960	3.55	109,955	390,338	3.55
Used in making briquettes.....	105,635	194,639	1.84	45,183	113,303	2.51
Put on bank.....	1,006,497	3,806,745	3.78	774,297	2,948,723	3.81
Put on waste heap.....	235,284			221,530		
Total disposition.....	18,472,214	66,465,661	3.60	15,673,010	55,523,332	3.54
Lifted from bank.....	975,657	3,400,491	3.49	791,686	2,673,584	3.38
Total output.....	17,496,557	63,065,170	3.60	14,881,324	52,849,748	3.55

Table 195.—Disposition of Coal from Canadian Mines by Provinces, 1929

(Short tons)

	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Yukon	Canada
Supplied to employees for domestic consumption.....	129,840	3,400	3,779	45,490	22,059	13	204,581
Coal shipped.....	6,363,984	207,904	459,302	6,713,906	2,078,818	221	15,824,135
Used under colliery boilers, etc.....	365,492	6,294	32,100	244,139	147,635	3	795,663
Used by companies' railroads.....	48,424	1,102	4,866	7,595	13,717		75,704
Used for manufacture of coke at colliery.....					115,482		115,482
Used in making briquettes.....			79,455	26,180			105,635
Used in shops, etc.....	108,509						108,509
Used by harbour tugs and dredges.....	724						724
Put on bank.....	855,026	20,740	2,605	61,183	66,943		1,006,497
Put on waste heap.....	14,844	53	614	110,179	109,373	221	235,284
Total disposition.....	7,886,843	239,493	582,721	7,208,672	2,554,027	458	18,472,214
Lifted from bank.....	830,710	20,787	2,532	57,979	63,649		975,657
Total output.....	7,056,133	218,706	580,189	7,150,693	2,490,378	458	17,496,557

Table 196.—Disposition of Coal from Canadian Mines by Provinces, 1930

(Short tons)

	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Yukon	Canada
Supplied to employees for domestic consumption.....	120,846	3,036	3,252	40,326	22,214	10	189,684
Coal shipped (see table 197).....	5,648,034	199,749	515,010	5,379,121	1,709,641	293	13,451,848
Used under colliery boilers, etc.....	306,179	5,362	33,024	220,389	139,433	50	704,437
Used by companies' railroads.....	47,326	900	3,911	7,722	12,948		72,807
Used for manufacture of coke at colliery.....					109,955		109,955
Used in making briquettes.....			22,911	22,272			45,183
Used in shops, etc.....	103,269						103,269
Used by harbour tugs and dredges.....							
Put on bank.....	685,242	9,731	2,262	41,576	35,486		774,297
Put on waste heap.....	14,024	53	993	97,447	109,713	300	221,530
Total disposition.....	6,924,920	218,831	581,363	5,808,853	2,138,290	653	15,673,010
Lifted from bank.....	672,368	9,482	1,939	53,325	54,572		791,686
Total output.....	6,252,552	209,349	579,424	5,755,528	2,083,818	653	14,881,324

Table 197.—Shipments of Coal from Canadian Mines by Grades and Destinations, 1929 and 1930

(Short tons)

Destination	1929				1930			
	Run-of-mine	Screened	Slack	Total	Run-of-mine	Screened	Slack	Total
Prince Edward Island.....	3,130	77,241	2,214	82,585	3,398	82,313	2,193	87,904
Nova Scotia.....	335,851	651,042	843,299	1,830,192	214,339	572,208	738,516	1,525,063
New Brunswick.....	214,058	150,133	129,667	493,858	167,344	141,067	195,737	504,148
Quebec.....	67,591	1,137,112	1,167,838	2,372,541	53,634	964,711	875,749	1,894,094
Ontario.....	703	46,330	9,236	56,269	845	26,022	4,845	31,712
Manitoba.....	158,420	426,495	240,024	824,939	167,621	366,714	241,531	775,866
Saskatchewan.....	259,860	1,032,840	424,147	1,716,847	205,247	893,078	440,544	1,538,869
Alberta.....	261,088	537,838	599,652	1,398,578	256,352	463,005	508,441	1,227,798
British Columbia.....	46,451	724,672	252,979	1,024,102	40,213	710,160	249,036	999,409
Yukon.....		221		221		293		293
Total domestic shipments.....	1,347,152	4,783,924	3,669,056	9,800,132	1,108,993	4,219,571	3,256,592	8,585,156
Railroads.....	4,029,986	817,399	363,604	5,210,989	3,021,284	750,493	313,451	4,085,228
Ships' bunkers.....	253,946	111,476		365,422	250,311	82,481	895	333,687
Total railroads and ships' bunkers.....	4,283,932	928,875	363,604	5,576,411	3,271,595	832,974	314,346	4,418,915
United States.....	19,592	104,618	53,764	177,974	10,647	74,234	64,869	149,750
Alaska.....		23,891		23,891		26,456		26,456
Newfoundland.....	9,916	234,264	540	244,720	2,080	204,120	57,637	263,837
Other places.....		438		438				
Lost at sea.....		569		569		4,318	3,416	7,734
Total external shipments.....	29,508	363,780	54,304	447,592	12,727	309,128	125,922	447,777
Total.....	5,660,592	6,076,579	4,086,964	15,824,135	4,393,315	5,361,673	3,696,860	13,451,848

Table 198.—Tonnage Lost in the Coal Mines of Canada in 1929 and 1930 Showing, by Provinces, the Relative Percentages Produced and Lost with an Analysis of the Percentage Lost.

Province		Per cent produced	Per cent lost	Percentage lost through				
				Absenteeism	Lack of orders	Car shortage	Mine disability	Other causes
NOVA SCOTIA.....	1929	81	19	3.8	7.3	0.0	6.5	1.4
	1930	72	28	2.0	20.0	0.0	5.2	0.8
NEW BRUNSWICK.....	1929	79	21	0.1	9.0	0.0	0.1	11.8
	1930	74	26	1.2	23.0	0.0	0.1	1.7
SASKATCHEWAN.....	1929	68	32	0.0	31.0	0.0	0.0	1.0
	1930	64	36	0.0	35.6	0.0	0.0	0.4
ALBERTA.....	1929	74	26	0.6	21.0	1.6	0.7	2.1
	1930	66	34	0.2	32.2	0.3	0.3	1.0
BRITISH COLUMBIA.....	1929	81	19	0.8	15.2	1.6	0.4	1.0
	1930	73	27	0.5	25.3	0.3	0.5	0.5
Canada.....	1929	78	22	1.8	15.0	0.8	2.8	1.6
	1930	70	30	0.8	26.2	0.1	2.2	0.7

Table 199.—Imports of Anthracite and Bituminous Coal into Canada from Great Britain, by Grades and by Provinces, 1929-1930

(Short tons)

Destination	1929			1930		
	Anthracite		Bituminous, all grades	Anthracite		Bituminous, all grades
	Egg, nut etc.	Dust		Egg, nut, etc.	Dust	
Prince Edward Island.....	2,223				1,496	1,676
Nova Scotia.....	31,612		21,991	29,859		19,557
New Brunswick.....	50,798	1,911	341	60,844		35
Quebec.....	592,838	5,946	92,941	863,972	39,956	124,931
Ontario.....	44,130					
British Columbia.....			95			
Canada.....	721,601	7,857	115,368	954,675	41,452	146,199

Table 200.—Imports of Anthracite, Bituminous and Lignite Coal into Canada from the United States by Grades and by Provinces, 1929 and 1930

(Short tons)

Destination	1929				1930			
	Anthracite		Bituminous, all grades	Lignite	Anthracite		Bituminous, all grades	Lignite
	Egg, nut, etc.	Dust			Egg, nut, etc.	Dust		
Prince Edward Island.....	4,121	836	8,982		5,274	2,759	4,408	
Nova Scotia.....	26,695		14,153		30,086		18,018	
New Brunswick.....	44,653	455	75,767		26,827	1,498	72,299	
Quebec.....	682,533	148,763	1,242,180		599,520	155,377	1,111,811	
Ontario.....	2,098,544	156,413	13,067,713		1,978,818	147,104	11,955,589	
Manitoba.....	6,701	2,479	38,801	1,896	4,764	3,559	24,898	
Saskatchewan.....	365		2,477	41	367		1,816	736
Alberta.....			1,327				1,351	
British Columbia.....	484	1	18,364	12,171		1	8,879	17,940
Yukon.....			67				7	
Canada.....	2,864,096	308,947	14,469,831	14,108	2,645,656	310,298	13,199,076	18,676

Table 201.—Imports of Anthracite and Bituminous Coal into Canada from Other Countries, by Provinces, 1929 and 1930

(Short tons)

Destination	Source	1929			1930		
		Anthracite		Bitu- minous, all grades	Anthracite		Bitu- minous, all grades
		Egg, nut, etc.	Dust		Egg, nut, etc.	Dust	
Nova Scotia.....	Russia.....	5,601			14,340		
New Brunswick.....	Russia.....	12,697			24,880		
Quebec.....	Germany.....				11,480		
	Russia.....	99,006			252,187		
British Columbia.....	Newfoundland.....			76			33
	Japan.....	112					
	French East Indes.....				1,122		
Canada.....		117,416		76	304,009		33

Table 202.—Average Imports of Coal into Canada by Kinds and by Provinces for the Five Years 1926-1930

(Short tons)

Destination	Anthracite			Total bitumin- ous	Lignite	Total all grades
	Egg, nut, etc.	Dust	Total			
Prince Edward Island.....	5,550	1,018	6,568	5,163		11,731
Nova Scotia.....	61,931	2	61,933	33,350		95,283
New Brunswick.....	97,911	1,449	99,360	78,449		177,809
Quebec.....	1,414,997	188,991	1,603,988	1,504,629		3,108,617
Central Ontario.....	2,077,796	139,874	2,217,670	10,932,392		13,150,062
Head of Lakes.....	58,681	429	59,110	1,507,065		1,566,175
Total Ontario.....	2,136,477	140,303	2,276,780	12,439,457		14,716,237
Manitoba.....	9,304	2,998	12,302	90,587	379	103,268
Manitoba and Head of Lakes.....	67,985	3,427	71,412	1,597,652	379	1,669,443
Saskatchewan.....	452		452	2,172	167	2,791
Alberta.....				1,375		1,375
British Columbia.....	2,699	4	2,703	20,322	12,417	35,442
Yukon.....				26		26
Canada.....	3,729,321	334,765	4,064,086	14,175,530	12,963	18,252,579

Table 203.—Average Imports of Coal into Central Canada by Principal Areas for the Five Years 1926-1930

(Short tons)

Destination	Anthracite			Total bituminous	Total all grades
	Egg, nut, etc.	Dust	Total		
Quebec.....	109,374	5,925	115,299	118,226	233,525
Montreal.....	1,275,597	177,410	1,453,007	1,253,824	2,706,831
Ottawa.....	225,228	40,026	265,254	987,743	1,252,997
Kingston.....	99,603	2,574	102,177	228,745	330,922
British Guiana.....	1,483,251	92,859	1,576,110	5,310,356	6,886,466
Toronto.....	271,990	4,376	276,366	3,121,306	3,397,672
Windsor.....					
Total.....	3,465,043	323,170	3,788,213	11,020,200	14,808,413

Table 204.—Exports of Canadian Coal by Destination, 1928-1930

(Compiled in the *External Trade Branch*)

Destination	1928		1929		1930	
	Short tons	Value	Short tons	Value	Short tons	Value
BRITISH EMPIRE						
		\$		\$		\$
United Kingdom.....	27,390	202,252	26,605	195,958	18,453	132,602
Irish Free State.....	484	3,003	683	4,343	1,745	10,531
British South Africa.....	4,578	27,468	12,089	74,057	6,466	38,796
Bermuda.....	198	1,595	950	7,600		
British Guiana.....	1,066	6,393				
British Honduras.....					125	738
British India.....	514	4,266				
British West Indies—						
Jamaica.....	3,017	25,040				
Other B.W.I.....					396	3,286
Gibraltar.....	3,924	23,892	1,355	8,010	5,123	30,737
Malta.....	161	1,328				
Newfoundland.....	246,100	1,301,592	269,168	1,426,701	286,630	1,472,401
Sierra Leone.....	433	3,572			3,226	18,956
Australia.....	22,458	186,310	19,225	159,409	26,305	209,504
New Zealand.....	6,994	40,214	6,752	41,834	2,837	17,017
Total British Empire.....	317,317	1,826,925	336,807	1,917,912	351,306	1,934,568
FOREIGN COUNTRIES						
Argentina.....	4,046	24,276	1,066	6,396	5,193	31,158
Belgium.....	7,354	49,695	3,463	20,406	4,816	32,621
Brazil.....	4,046	24,276			1,530	9,180
China.....	499	4,141	4,994	41,448	565	4,690
Cuba.....	1,015	8,531	380	3,135	352	2,112
Denmark.....	513	3,163	758	4,548		
Finland.....	147	882				
France.....	1,701	11,666	5,108	35,171	2,832	17,815
French Possessions—						
French Africa.....	1,737	10,419			1,209	7,254
St. Pierre and Miquelon.....	5,742	34,831	2,248	13,746	2,652	16,021
Syria.....	333	1,998	290	1,740		
Germany.....	5,622	36,843	2,140	12,741	1,640	11,659
Greece.....	3,283	20,139	1,085	8,097	4,157	25,885
Honduras.....	276	1,380				
Iceland.....	135	844				
Italy.....	8,181	50,338	3,327	22,991	4,799	29,031
Japan.....	5,970	38,870			3,455	19,250
Netherlands.....	7,467	55,120	5,247	35,510	1,945	11,829
Norway.....	1,764	11,142	421	2,521	2,449	9,799
Peru.....					801	5,807
Poland and Danzig.....	398	2,491	371	2,489		
Portugal.....	1,672	12,829				
Russia.....	361	2,166				
San Domingo.....					38	190
Spain.....	3,221	19,512	916	5,493	705	5,816
Sweden.....	680	4,080	552	3,162	470	2,820
Turkey.....	383	2,298	641	4,352		
United States.....	455,495	2,028,482	451,516	2,080,807	210,326	1,003,080
Alaska.....	22,298	168,381	21,642	152,663	23,272	165,413
Porto Rico.....	264	1,650				
Uruguay.....	2,021	12,631				
Total foreign countries.....	546,624	2,643,074	506,165	2,457,416	273,206	1,411,430
Total.....	863,941	4,469,999	842,972	4,375,328	624,512	3,345,998

Table 205.—Annual Consumption of Coal in Canada, 1902-1930

Calendar year	Canadian†		Imported coal "entered for consumption"				Total	Per capita
			From U.S.A.	From Great Britain	Total*			
	Short tons	%	Short tons	Short tons	Short tons	%	Short tons	Short tons
1902.....	5,376,413	53.1	4,656,286	101,726	4,734,559	46.9	10,110,972	1.848
1903.....	6,005,735	47.3	6,520,931	184,693	6,678,450	52.7	12,684,185	2.212
1904.....	6,697,183	47.9	7,238,869	85,687	7,297,482	52.1	13,994,665	2.412
1905.....	7,032,661	49.4	7,233,738	68,500	7,215,446	50.6	14,249,107	2.341
1906.....	7,927,560	50.5	7,787,338	67,014	7,758,325	49.5	15,685,885	2.481
1907.....	8,617,352	45.0	10,588,697	54,325	10,549,503	55.0	19,166,855	2.947
1908.....	9,156,478	47.3	10,203,335	97,514	10,195,424	52.7	19,351,902	2.820
1909.....	8,913,376	47.9	9,805,253	67,671	9,711,826	52.1	18,625,202	2.682
1910.....	10,532,103	50.2	10,545,451	51,541	10,437,123	49.8	20,970,226	2.960
1911.....	9,822,749	40.5	14,510,129	48,963	14,424,949	59.5	24,247,698	3.365
1912.....	12,385,696	46.0	14,557,124	38,668	14,549,104	54.0	26,934,800	3.657
1913.....	13,450,158	42.6	18,145,769	37,825	18,132,387	57.4	31,582,545	4.196
1914.....	12,214,403	45.5	14,687,853	33,101	14,637,920	54.5	26,852,323	3.490
1915.....	11,500,480	48.1	12,450,796	15,098	12,406,212	51.9	23,906,692	3.041
1916.....	12,348,036	41.3	17,576,202	4,401	17,517,820	58.7	29,865,856	3.717
1917.....	12,313,603	37.2	20,848,009	9,451	20,810,132	62.8	33,123,735	4.049
1918.....	13,160,731	37.8	21,674,826	3,761	21,611,101	62.2	34,771,832	4.175
1919.....	11,611,168	40.3	17,292,913	344	17,236,269	59.7	28,847,437	3.402
1920.....	14,025,566	42.9	18,752,981	.....	18,668,741	57.1	32,694,307	3.788
1921.....	12,715,734	41.1	18,300,081	1,591	18,258,387	58.9	30,974,121	3.524
1922.....	13,044,352	50.2	12,255,555	765,980	12,962,189	49.8	26,006,541	2.909
1923.....	15,070,962	41.8	20,417,239	572,570	20,967,971	58.2	36,038,933	3.968
1924.....	12,529,358	42.8	16,405,344	317,112	16,714,143	57.2	29,243,501	3.100
1925.....	12,125,290	42.6	15,744,957	604,117	16,331,971	57.4	28,457,261	3.039
1926.....	15,449,831	48.3	16,204,405	287,299	16,565,555	51.7	32,015,386	3.329
1927.....	16,313,531	46.6	17,769,963	907,220	18,680,832	53.4	34,994,363	3.676
1928.....	16,700,352	49.3	16,515,149	632,755	17,200,043	50.7	33,900,395	3.510
1929.....	16,653,585	47.8	17,243,047	843,502	18,186,727	52.2	34,840,312	3.556
1930.....	14,052,671	42.8	17,323,818	1,144,861	18,763,924	57.2	32,816,595	3.303

†The sum of Canadian coal mine sales, colliery consumption, coal supplied to employees, and coal used in making coke, etc., less the tonnage of coal exported.

*Includes small tonnages from countries other than Great Britain and United States. Deductions have been made to take account of foreign coal re-exported from Canada.

Table 206.—Summary Statistics for 1930-Output, Exports, Interprovincial Shipments, Imports and Coal made Available for Consumption in Canada, by Provinces

(Short tons)

Province	Canadian coal				Imported from U.S.A.	Imported from Great Britain	Imported from Russia	Imported from other countries	Coal available for consumption
	Output	Received from other provinces	Shipped to other provinces	Ex-ported					
PRINCE EDWARD ISLAND—									
Anthracite.....					8,033	1,496			9,529
Bituminous.....		87,904			4,408	1,676			93,988
Total.....		87,904			12,441	3,172			103,517
NOVA SCOTIA—									
Anthracite.....					30,086	29,859	14,340		74,285
Bituminous.....	6,252,552		2,424,578	350,154	18,018	19,557			3,515,395
Total.....	6,252,552		2,424,578	350,154	48,104	49,416	14,340		3,589,680
NEW BRUNSWICK—									
Anthracite.....					28,325	60,844	24,880		114,049
Bituminous.....	209,349	443,111	499	24,724	72,299	35			699,571
Total.....	209,349	443,111	499	24,724	100,624	60,879	24,880		813,620
QUEBEC—									
Anthracite.....					754,897	903,928	252,187	(a) 11,480	1,922,492
Bituminous.....		1,894,062		200	1,111,811	124,931		(b) 33	3,130,637
Sub-bituminous.....		32							32
Total.....		1,894,094		200	1,866,708	1,028,859	252,187	11,513	5,053,161
CENTRAL ONTARIO—									
Anthracite.....					2,080,681				2,080,681
Bituminous.....				38	10,492,151				10,492,253
Sub-bituminous.....	*	140							5,729
Lignite.....	*	5,729		32					25,811
Total.....		31,712		70	12,572,832				12,604,474
MANITOBA AND HEAD OF LAKES—									
Anthracite.....					53,564				53,564
Bituminous.....		87,548		433	1,488,336				1,575,451
Sub-bituminous.....		74,031							74,031
Lignite.....		614,287		1,969					612,318
Total.....		775,866		2,402	1,541,900				2,315,364
SASKATCHEWAN—									
Anthracite.....					367				367
Bituminous.....		127,788		16	1,816				129,588
Sub-bituminous.....		61,733							61,733
Lignite.....	579,424	1,101,598	226,475	6,059	736				1,449,224
Total.....	579,424	1,291,119	226,475	6,075	2,919				1,640,912
ALBERTA—									
Bituminous.....	2,278,467	34,444	179,702	99	1,351				2,134,461
Sub-bituminous.....	603,358		193,321						410,037
Lignite.....	2,873,703	1,535	1,650,336	1,222					1,223,680
Total.....	5,755,528	35,979	2,023,359	1,321	1,351				3,768,178
BRITISH COLUMBIA—									
Anthracite.....					1			(c) 1,122	1,123
Bituminous.....	2,083,818	41,597	111,815	218,826	8,879				1,803,653
Sub-bituminous.....		51,796							51,796
Lignite.....		133,548		20,740	17,940				130,748
Total.....	2,083,818	226,941	111,815	239,566	26,820			1,122	1,987,320
YUKON—									
Bituminous.....	653				7				660
Total.....	653				7				660
CANADA—									
Anthracite.....					2,955,954	996,127	291,407	12,602	4,256,090
Bituminous.....	10,824,839	2,716,594	2,716,594	594,490	13,199,076	146,199		33	23,575,657
Sub-bituminous.....	603,358	193,321	193,321						603,358
Lignite.....	3,453,127	1,876,811	1,876,811	30,022	18,676				3,441,781
Total.....	14,881,324	4,786,726	4,786,726	624,512	16,173,706	1,142,326	291,407	12,635	31,876,886

(a) Imported from Germany. (b) Imported from Newfoundland. (c) Imported from French East Indies.

*Includes all coal shipped to any point in Ontario from western mines.

Table 207.—World Production of Coal* 1926-1930

(Including brown coal)

(Long tons)

Country	1926	1927	1928	1929	1930
BRITISH EMPIRE					
Great Britain—					
Anthracite.....	2,876,655	6,346,890	5,521,570	6,364,036	6,400,705
Bituminous (a).....	123,401,866	244,885,446	231,950,361	251,542,766	237,481,119
Lignite.....		502	640	322	
Nigeria (b).....	324,575	357,899	359,316	344,937	347,842
Southern Rhodesia.....	860,338	894,396	1,077,557	1,020,446	923,915
Union of South Africa.....	12,745,492	12,381,692	12,407,539	12,812,790	12,029,529
Canada—					
Bituminous.....	11,065,249	11,613,389	11,580,241	11,481,984	9,665,035
Sub-bituminous.....	437,264	532,281	661,157	597,055	538,712
Lignite.....	3,210,104	3,414,027	3,432,078	3,542,887	3,083,149
British Borneo—					
State of North Borneo.....	71,434	62,701	60,779	58,339	45,839
Sarawak.....	19,683	16,445	17,679	13,610	14,680
Federated Malay States.....	464,284	463,001	556,590	661,514	565,573
India—					
Gondwana Coalfields.....	20,583,202	21,664,488	22,153,314	23,001,586	23,803,048
Tertiary Coalfields.....	415,965	417,848	389,558	417,148	
Australia—					
Bituminous.....	13,250,000	13,522,960	11,839,780	10,365,319	9,500,000
Lignite.....	957,935	1,455,482	1,591,858	1,741,176	†
New Zealand—					
Bituminous.....	1,196,388	1,290,529	1,348,732	1,367,164	2,542,092
Brown coal.....	905,825	954,436	973,238	1,049,603	
Lignite.....	137,786	121,775	114,783	119,097	
Total.....	193,000,000	320,000,000	306,000,000	327,000,000	307,000,000
FOREIGN COUNTRIES					
Austria—					
Bituminous.....	154,824	172,828	198,906	204,735	212,478
Brown coal.....	2,911,015	3,015,675	3,211,042	3,469,123	3,014,605
Belgium—					
Anthracite and semi-anthracite.....	5,247,611	5,899,589	6,035,006	5,826,029	26,972,727
Bituminous.....	19,613,048	21,216,242	21,107,733	20,638,421	
Bulgaria—					
Anthracite.....	1,186,713	1,218,099	1,183	2,479	1,548,354
Bituminous.....			67,255	75,130	
Brown coal.....			1,339,298	1,548,121	
Czechoslovakia—					
Bituminous.....	13,953,092	13,794,932	14,330,345	16,260,524	14,207,021
Brown coal.....	18,223,237	19,310,756	20,128,419	22,204,480	18,890,532
France—					
Saar.....	13,464,803	13,391,097	12,899,716	13,364,882	13,026,730
Other districts—					
Anthracite and bituminous.....	50,579,865	50,960,760	50,554,526	52,930,400	53,033,011
Lignite.....	1,044,363	1,050,434	1,046,891	1,178,329	1,124,685
Germany—					
Bituminous.....	143,000,979	151,173,466	148,477,965	160,859,314	140,444,047
Lignite.....	136,952,867	148,126,913	162,972,863	171,700,657	143,609,312
Greece—					
Lignite.....	150,899	141,082	118,734	154,054	108,419
Hungary—					
Bituminous.....	813,846	773,447	770,908	813,220	798,732
Brown coal.....	5,561,158	5,983,940	6,240,930	6,659,925	5,746,586
Lignite.....					
Italy—					
Anthracite.....	15,460	16,573	10,321	14,007	19,530
Bituminous.....	190,495	149,293	115,590	205,813	207,946
Brown coal.....	1,162,684	898,047	686,024	769,694	567,750
Jugoslavia—					
Bituminous.....	187,800	283,184	351,826	435,131	360,430
Brown coal.....	2,965,800	3,433,470	3,608,130	4,326,603	3,748,858
Lignite.....	921,754	954,586	1,012,136	1,036,945	1,077,869
Netherlands—					
Bituminous.....	8,471,616	9,175,868	10,525,314	11,398,293	12,018,229
Brown coal.....	207,858	198,201	193,589	154,095	141,873
Poland—					
Bituminous.....	35,182,768	37,482,601	39,974,905	45,505,803	36,907,295
Brown coal.....	74,825	77,225	72,398	73,147	
Portugal—					
Anthracite.....	197,353	201,127	195,705	175,864	183,471
Bituminous.....			2,460	18,098	27,345
Brown coal.....	34,306		26,031	28,880	33,928
Roumania—					
Bituminous.....	317,102	367,559	391,285	365,088	294,105
Lignite.....	2,688,224	2,804,999	2,588,144	2,632,831	2,038,348

Table 207.—World Production of Coal* 1926-1930—Concluded

(Including brown coal)

(Long tons)

Country	1926	1927	1928	1929	1930
Russia—					
Anthracite.....	5,279,743				
Bituminous—					
European.....	15,009,393	32,026,639	34,657,125	38,084,000	45,722,000
Asiatic.....	2,830,323				
Brown coal.....	2,256,761				
Spain—					
Anthracite.....	396,494	423,106	383,243	491,851	580,123
Bituminous.....	6,036,364	6,036,177	5,885,667	6,504,199	6,529,171
Brown coal.....	393,515	422,817	415,831	432,018	374,094
Spitzbergen and Bear Island.....	(e) 286,531	314,380	280,418	247,218	†
Sweden.....	377,613	392,007	352,851	388,737	391,675
Algeria.....	13,514	20,932	16,368	15,873	16,922
Belgian Congo.....	88,800	86,000	88,000	112,642	131,700
Greenland.....	1,500	2,900	2,500	†	†
Mexico.....	1,288,462	1,015,020	999,787	1,043,277	1,054,794
United States—					
Anthracite.....	75,390,582	71,513,896	67,275,062	65,918,031	61,950,747
Bituminous (c).....	511,934,807	462,288,707	447,093,723	475,314,000	411,991,000
Brazil.....	400,000	231,294	246,327	187,251	†
Chile.....	1,466,968	1,458,113	1,353,890	1,484,051	1,328,692
Colombia.....	†	†	100,000	100,000	100,000
Peru.....	168,063	159,806	175,675	217,120	†
Venezuela.....	15,676	15,850	15,660	16,593	12,360
China (d).....	22,000,000	23,000,000	20,000,000	25,000,000	†
Dutch East Indies.....	1,443,200	1,594,616	1,676,472	1,802,737	1,667,000
Formosa.....	1,766,169	1,772,005	1,513,000	1,505,860	†
French Indo-China—					
Anthracite.....	1,226,943	1,422,083	1,883,409	1,872,373	1,860,000
Bituminous.....	37,428	38,041	39,826	38,277	47,000
Brown coal.....	5,510	7,038	15,228	30,228	28,000
Japan—					
Semi-anthracite.....	128,322	141,181	163,263	33,716,762	30,880,669
Bituminous.....	30,801,888	32,859,856	33,162,143	†	†
Brown coal.....	158,589	175,792	119,997	137,000	126,593
Karafuto.....	271,463	351,407	530,961	625,478	†
Korea—					
Anthracite.....	672,111	698,371	457,611	529,744	870,174
Bituminous.....	†	†	315,322	393,345	†
Philippine Islands.....	47,912	23,040	27,417	†	†
Tukey n Asia.....					
Bituminous.....	†	†	1,230,85	1,398,565	1,557,612
Lignite.....	1,215,095	892,310	9,105	7,747	8,044
New Caledonia.....	15,000	†	16,000	22,000	†
Total.....	1,150,000,000	1,130,000,000	1,130,000,000	1,200,000,000	1,080,000,000
Total.....	1,343,000,000	1,450,000,000	1,440,000,000	1,530,000,000	1,390,000,000

*Data obtained from *The Mineral Industry of the British Empire and Foreign Countries*.

† Information not available.

(a) Including a small quantity of anthracite mined in the Fife and Clackmanan districts.

(b) Years ended 31st March of the year following that stated.

(c) Including lignite.

(d) Approximate production.

(e) Exports.

THE COKE AND ARTIFICIAL GAS INDUSTRY

The coke and artificial gas industry in Canada in 1930 included the operation of 41 establishments, with a total capital investment of \$89,987,235. Employment was furnished by these plants to 3,970 employees who received \$5,864,802.

Output of gas-house, by-product and beehive coke during 1930 totalled 2,385,994 tons as compared with a total of 2,667,581 tons in the previous year. The seven by-product plants and the one beehive oven plant produced 2,062,764 tons; the thirty-three artificial gas plants made 323,230 tons. In addition, 92,087 tons of petroleum coke were recovered as a by-product of petroleum refining.

Artificial gas production amounted to 35,927,532 thousand cubic feet of which 10,177,933 thousand cubic feet were produced in gas plants and 25,749,599 thousand cubic feet in by-product coke ovens. Sales of gas reached a total of 17,713,477 thousand cubic feet valued at \$13,471,629; most of the remaining gas was used as a fuel in the producing plants or in associated metallurgical works. Petroleum refineries produced 3,529,319 thousand cubic feet of still gas for their own use.

Imports of gas or by-product coke into Canada during 1930 declined 13.5 per cent to 1,061,040 tons as against the importations in 1929 of 1,226,853 tons. On the other hand, exports of coke, exclusive of petroleum coke, advanced 18.2 per cent to 29,801 tons. Petroleum coke exports amounted to 24,178 tons. Ground coke imported for use in the manufacture of electric batteries was recorded at 430 tons.

Table 208.—Materials used in the Coke and Gas Industry in Canada, 1928-1930

Materials	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
Bituminous coal:—		\$		\$		\$
(a) Canadian..... tons	909,539	3,144,963	961,391	3,308,849	736,466	2,752,048
(b) Foreign..... tons	2,289,660	11,674,045	2,696,168	12,676,139	2,454,577	11,565,120
Anthracite coal for gas-making..... tons	1,317	15,362				
Coke for gas-making:—						
(a) Purchased..... tons	9,630	102,462	7,728	73,080	9,448	95,800
(b) Companies' own make..... tons	96,476	637,083	140,078	1,006,941	144,739	1,085,251
Oil (gas oil) for gas-making..... imp. gal.	11,868,419	1,008,226	9,364,684	787,855	12,401,166	992,642
Calcium carbide..... lb.	148,410	6,272	82,740	3,398	46,815	2,047
Lime..... tons	2,527	20,508	2,302	21,769	1,942	19,015
Water.....		14,734		34,222		41,249
Oxide or purifying materials..... tons	2,753	21,882	4,959	49,775	5,560	52,254
Sulphuric acid, 66°Bé..... lb.	46,366,147	325,067	54,314,786	406,462	48,194,821	328,489
All other materials.....		193,642		148,724		148,449
Total cost.....		17,164,246		18,517,214		17,082,364

Table 209.—Production in Canada, Imports and Exports of Coke and its By-Products, 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
Coke—		\$		\$		\$
PRODUCTION—by provinces—						
Nova Scotia and New Brunswick..... tons	463,093	2,189,648	499,080	2,436,683	680,911	4,361,204
Quebec..... tons	240,204	1,736,843	351,372	2,822,763		
Ontario..... tons	1,443,512	9,332,926	1,624,884	11,112,809	1,516,080	10,021,292
Manitoba..... tons	34,641	337,446	44,597	461,504		
British Columbia..... tons	132,677	935,848	157,648	1,113,899	189,003	1,469,751
Total..... tons	2,314,127	14,535,711	2,677,581	17,947,658	2,385,994	15,852,247
IMPORTS..... tons	1,060,029	6,102,842	1,226,853	6,659,514	1,061,040	5,611,897
EXPORTS..... tons	25,058	183,728	25,208	189,247	29,801	217,587
APPARENT CONSUMPTION..... tons	3,349,098	20,454,825	3,879,226	17,947,658	3,417,233	15,852,247
Other Products						
*PRODUCTION—						
Ammonium sulphate..... tons	28,090	1,108,744	34,140	1,296,952	23,626	926,485
Gas: (a) Sales..... M cu.ft.	15,606,609	13,933,537	17,649,371	13,316,684	17,713,477	13,471,629
(b) Used in own plants..... M cu.ft.	7,004,731	1,369,655	7,493,291	1,573,146	6,259,021	1,378,352
(c) Used in associated metallurgical works..... M cu.ft.	11,237,155	1,295,644	12,870,553	1,411,670	11,019,147	1,221,625
(d) Gas otherwise accounted for, but not sold..... M cu.ft.	54,250		178,092	185,595	134,519	136,067
(e) Not accounted for..... M cu.ft.	1,156,175	211,327	733,779	888,122	801,368	859,639
Light oils..... imp. gal.	4,052,859	500,365	6,058,061	874,012	4,902,023	949,670
Tar and tar products..... imp. gal.	27,141,332	1,721,432	30,119,476	1,963,746	27,378,400	1,757,902
Ammonia liquor..... pound NH ₃	1,644,516	25,867	1,694,538	25,631	2,288,680	33,874
Pitch..... tons					163	3,018
All other products.....		6,145		4,979		2,351
IMPORTS—						
Ammonium sulphate..... tons	3,510	174,899	1,723	80,019	3,423	137,067
Coal tar and pitch..... gal.	6,003,182	438,244	6,429,566	518,878	4,965,646	343,748
EXPORTS—						
Ammonium sulphate..... tons	13,632	561,696	24,489	909,510	12,010	386,710
Tar and pitch..... gal.	3,572,781	311,031	3,069,247	140,541	4,555,899	182,478

*Production data include the output of the *Coke and its By-products Industry* and of the *Illuminating and Fuel Gas Industry*.

THE NATURAL GAS INDUSTRY

The production of natural gas in Canada during 1930 amounted to 29,376,919 thousand cubic feet valued at \$10,289,985, an increase of 3.5 per cent in quantity and 3.1 per cent in value over the 1929 output of 28,378,462 thousand cubic feet worth \$9,977,124. Alberta was the principal producing province with an output of 20,748,583 thousand cubic feet; Ontario came next with 7,965,761 thousand cubic feet; and New Brunswick followed with 661,975 thousand cubic feet. There was the usual small production from several private wells in Manitoba.

New Brunswick's natural gas is obtained from wells in the Stony Creek field. Approximately 6,300 domestic and industrial consumers in Moncton and Hillsboro are supplied with gas from this field.

In Quebec, the staking of oil and gas areas in the counties south of the St. Lawrence river which commenced late in 1929, was continued throughout 1930. Several thousand square miles are held under temporary titles in this district and operators are making provision to drill to 6,000 feet.

Natural gas consumption in Ontario declined 7.2 per cent due to lessened industrial demand and to milder weather during the fall and winter of 1930. An increase of 3,144 was recorded in the number of pay consumers in Ontario; the total for the year was 84,135. According to the *Ontario Commissioner of Natural Gas*, new discoveries of gas have improved the service to the municipalities in Lambton county that have been dependent, heretofore, on the Tilbury field and have reduced the distance from the gas field by forty miles. Drilling activities in 1930 resulted in the extension of the De Clute and Dawn fields; the discovery of the Mosa (or Newberry) gas field and the extension of the Middleton township gas field. At the close of the year 2,108 wells were producing natural gas in Ontario. During the year 54 wells were abandoned, 158 producing wells and 72 dry wells were drilled; the total footage drilled was 232,940.

Manitoba's production is obtained from private wells near Coulter, Treherne and Waskada.

The Turner Valley field, located about 35 miles southwest of Calgary, Alberta, was Canada's principal natural gas producing area in 1930. The total natural gas used from this field during the year was 12,817,734 thousand cubic feet. This gas was piped to Calgary where over 24,000 industrial and domestic consumers were served. In addition to the Calgary consumption, considerable quantities of Turner Valley gas were used in the field for drilling purposes. In 1930, experimental work in connection with the storing of Turner Valley waste gas in the exhausted sands of the Bow Island field was continued.

Natural gas consumption in Medicine Hat totalled 3,071,000 thousand cubic feet in 1930. The 28 wells in the ^{Turner Valley} field supplied gas to 2,500 industrial and domestic consumers. Eight wells in the Redcliff field, 2 miles west of Medicine Hat, supplied gas for local consumption.

Edmonton obtains its supply of gas from the Viking field, located about 80 miles southeast of the city. In 1930, over 10,000 consumers in Edmonton used this gas. In addition, approximately 600 users outside of Edmonton were supplied with gas from this field.

Lethbridge and some small centres were furnished with gas from the Canadian Western Natural Gas Company's pipe line. Gas from the Maple Leaf well in the Fabyan field supplied the domestic requirements of 311 consumers in Wainwright during 1930. Bow Island, Suffield and Wetaskiwin obtained their gas supply in 1930 from local wells.

Mixed gas (natural and artificial) imported into Canada from the United States amounted to 151,671 thousand cubic feet valued at \$96,763; in 1929 imports totalled 132,942 thousand cubic feet at \$85,338.

Fixed and current assets reported by the 124 firms operating in Canada amounted to \$70,548,353. This industry furnished employment to 1,941 salaried employees and wage-earners, who received a total remuneration of \$2,349,703. The cost of fuel and electricity used during the year was \$33,811. Primary power employed consisted of 145 units with a manufacturer's rating of 2,745 h.p.

Table 210.—Production of Natural Gas in Canada, by Provinces, 1920-1930

(For the years 1892 to 1919 see Mineral Production of Canada, 1928)

Year	New Brunswick		Ontario		Manitoba		Alberta		Canada	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		\$		\$		\$		\$		\$
1920.....	682,502	130,506	10,529,374	2,920,731	200	60	5,633,442	1,181,345	16,845,518	4,232,642
1921.....	708,742	139,375	8,422,774	3,080,130	200	60	4,945,884	1,374,599	14,077,601	4,594,164
1922.....	753,898	148,040	8,080,114	4,076,296	200	60	5,868,438	1,622,105	14,682,651	5,844,501
1923.....	640,300	126,068	8,128,413	4,066,244	200	60	7,191,670	1,692,246	15,969,583	5,884,618
1924.....	599,972	113,577	7,150,078	3,798,381	200	60	7,131,087	1,796,618	14,881,337	5,708,636
1925.....	639,235	122,394	7,143,962	3,958,000	200	60	9,119,500	2,752,545	16,902,897	6,833,005
1926.....	648,316	128,300	7,764,996	4,409,593	200	60	10,794,697	3,019,221	19,208,209	7,557,174
1927.....	630,755	124,637	7,311,215	4,331,780	200	60	13,434,621	3,586,533	21,376,791	8,043,010
1928.....	660,981	324,344	7,632,800	4,535,312	200	60	14,288,605	3,754,466	22,552,586	8,614,152
1929.....	678,456	333,002	8,586,475	4,959,695	600	180	19,112,931	4,684,247	28,378,462	9,977,124
1930.....	661,975	325,751	7,965,761	5,034,828	600	180	20,748,533	4,929,225	29,376,919	10,289,98

Table 211.—Number of Gas Wells in Canada, by Provinces, 1928, 1929 and 1930

		New Brunswick	Ontario	Manitoba	Alberta	Canada
Productive wells at beginning of year.....	1928	26	2,172	3	86	2,287
	1929	28	1,922	3	84	2,037
	1930	30	2,120	6	90	2,246
Number of productive wells drilled.....	1928	2	126	.....	2	130
	1929	2	118	.....	8	128
	1930	1	158	.....	2	161
Number of dry wells drilled.....	1928	.....	51	.....	2	53
	1929	.....	76	.....	.....	76
	1930	.....	72	.....	4	76
Number of wells abandoned.....	1928	.....	54	.....	5	59
	1929	.....	42	.....	2	44
	1930	.....	54	.....	4	58
Productive wells at end of year.....	1928	28	1,922	3	84	2,037
	1929	30	2,120	6	90	2,246
	1930	28	2,108	6	85	2,227

Table 212.—Natural Gas Wells in Ontario, by Townships, 1929 and 1930

Township	1929				1930			
	No. of producing wells in operation Dec. 31, 1929	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1930	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Amabel.....	2				2			
Ancaster.....								
Bayham.....	40	1			39	1		
Bertie.....	84	1			89	2		8
Binbrook.....	42				42	1		
Brantford.....								
Caledon E.....								
Caistor.....	15	1	1	5	39	2	2	15
Canboro.....	117	1			100	3		1
Cayuga, North.....	108	5	7	19	102	11	14	19
Cayuga, South.....	56	2			55	2		
Charlotteville.....	15				12	1		
Colchester, N.....			1					
Crowland.....	47	1	3		47	1		1
Dawn.....	13		6		17		5	4
Dorchester, N.....	3							
Dover, East.....	2		2	1	2		3	1
Dover, West.....	6	2	5		6			
Dunn.....	30		8	1	31	1	1	1
Enniskillen.....	2				2			
Euphemia.....		4	3	1				
Gainsboro.....	3				6			
Glanford.....	11	3			11			
Gosfield.....	17				17			
Houghton.....	3				3			
Howard.....			3					
Humberstone.....	76	9			74	1		
Mersea.....	1				2			
Middleton.....	25				25	1		1
Malahide.....	2				1	1		
Mosa.....			1		1		4	1
Moulton.....	91	1			80	7		1
Oneida.....	23				23	3	3	3
Onondaga.....	25	2			23			1
Rainham.....	144	1	8	33	134	2	4	20
Raleigh.....	14		1	2	29		7	11
Romney.....	143	1	4	3	143		1	3
Sarnia.....	5				14			
Seneca.....	144	1	14	24	163	2	11	17
Sherbrooke.....	11				10	1	2	2
Tilbury, East.....	132	1		1	137	3		2
Townsead.....	1							
Tuscarora.....	9		1	9	44		2	28
Wainfleet.....	36	1			36	4		
Walpole.....	137	1	8	17	106		13	17
Walsingham, N.....	10				12			
Walsingham, S.....	7	1			5	1		
Windham.....	8							
Willoughby.....	37	2			38			1
Woodhouse.....	52	1		2	15	3		
Private wells.....	300				300			
Surface wells.....	71				71			
Total	2,120	42	76	118	2,108	54	72	158

Table 213.—Capital Employed in the Natural Gas Industry in Canada by Provinces, 1929 and 1930

	1929			1930		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—						
Cost of lands, buildings, plant, machinery and tools.....	33,411,510	24,115,323	57,526,833	34,946,348	25,104,285	60,050,633
Cost of supplies and stocks on hand.....	623,512	269,115	892,627	586,457	236,011	822,468
Cash, trading and operating accounts and bills receivable.....	6,661,271	1,720,715	8,381,986	6,275,149	1,619,880	7,895,029
Total	40,696,293	26,105,153	*68,592,709	41,807,954	26,960,176	*70,548,353

* Includes data for New Brunswick.

Table 214.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
1929							
New Brunswick.....	12	5	53	70	31,181	50,938	82,119
Ontario.....	374	105	890	1,369	626,818	877,926	1,504,744
Alberta.....	89	27	398	514	223,526	464,758	688,284
Canada.....	475	137	1,341	1,953	881,525	1,393,622	2,275,147
1930							
New Brunswick.....	12	7	55	74	21,776	59,859	91,635
Ontario.....	416	103	838	1,357	756,570	798,649	1,555,219
Alberta.....	85	27	398	510	186,542	516,307	702,849
Canada.....	513	137	1,291	1,941	974,888	1,374,815	2,349,703

* See note page 37.

Table 215.—Wage-Earners in the Natural Gas Industry in Canada, by Months and by Provinces, 1929 and 1930

Month	1929				1930			
	New Brunswick	Ontario	Alberta	Canada	New Brunswick	Ontario	Alberta	Canada
January.....	13	392	188	593	31	357	257	645
February.....	15	345	216	576	29	342	248	619
March.....	18	424	207	649	29	372	307	708
April.....	35	736	266	1,037	46	617	427	1,090
May.....	48	900	364	1,312	48	904	473	1,425
June.....	59	984	415	1,458	87	995	518	1,600
July.....	64	1,048	427	1,539	86	1,026	525	1,637
August.....	89	1,137	412	1,638	87	1,024	447	1,558
September.....	98	1,022	370	1,490	87	860	436	1,383
October.....	88	977	311	1,376	50	632	390	1,072
November.....	79	946	239	1,264	48	780	353	1,181
December.....	31	728	230	989	36	770	270	1,076

THE PEAT INDUSTRY

Peat production in Canada during 1930 amounted to 2,847 tons valued at \$10,932 as compared with 2,607 tons worth \$13,339 produced in 1929.

Shipments from the St. Hyacinthe bog totalled 2,219 tons, an increase of 38.1 per cent over the 1929 total of 1,607 tons. Air-dried machine peat is produced at this bog by the "hydro-peat" process. This peat finds a ready market for household use. During 1930, a considerable quantity of St. Hyacinthe peat was used for burning lime at St. Dominique.

The peat plant at Alfred, Ontario was not in operation during 1930. Shipments totalling 628 tons were made during the year from stock on hand.

Table 216.—Production of Peat in Canada, 1900-1930

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1900.....	400	1,200	1910.....	841	2,604	1921.....	1,666	6,664
1901.....	220	600	1911.....	1,463	3,817	1922.....	3,000	14,500
1902.....	475	1,663	1912.....	700	2,900	1923-24.....		
1903.....	1,100	3,300	1913.....	2,600	10,100	1925.....	1,370	8,394
1904.....	800	2,400	1914.....	685	2,470	1926-1927.....		
1905.....	80	260	1915.....	300	1,050	1928.....	1,497	5,845
1906.....	474	1,422	1916.....	300	1,500	1929.....	2,607	13,339
1907.....	50	200	1917-18.....			1930.....	2,847	10,932
1908.....	60	180	1919.....	986	6,561			
1909.....	60	240	1920.....	4,550	18,650	Total.....	29,131	120,791

THE PETROLEUM INDUSTRY IN CANADA

Including (1) Production of Crude Petroleum; and (2) Petroleum Products.

1. Production of Crude Petroleum

Canadian production of crude petroleum set up a new high record in 1930 when 1,522,220 barrels valued at \$5,033,820 were produced. During the preceding year the output was 1,117,368 barrels worth \$3,731,764. In 1930, New Brunswick wells produced 6,758 barrels, Ontario wells 117,302 barrels and Alberta wells 1,398,160 barrels.

The Alberta production included 1,340,428 barrels from the Turner Valley field and the remainder from the Red Coulee, Wainwright-Ribstone, Skiff and Fuego fields. Eighty-nine wells were in operation in Alberta at the close of 1930 and drilling was in progress on 55 other wells in the Turner Valley, Wainwright-Ribstone, Red Coulee, Highwood, and other fields. The total footage drilled during the year was 190,125; in addition, approximately 35,472 feet of structure-test drilling was done. Forty-one new wells were brought into production during the year. Firms operating in Alberta fields during 1930 reported the use of 425,853 feet of casing weighing 8,309 tons. This casing was valued at \$1,007,223.

Ontario's production declined 3.2 per cent in quantity and 7.1 per cent in value to 117,302 barrels worth \$235,746 as compared with the 1929 output of 121,194 barrels valued at \$253,678. The 1930 production was the lowest on record for the province.

New Brunswick's output was obtained from wells in the Stony Creek field, near Moncton. Drilling operations in Saskatchewan were continued in the Simpson and Unity Valley fields. At the end of the year drilling was in progress on two wells in the Dauphin and Manitou fields, Manitoba.

A decline of 14.4 per cent was recorded in the imports of petroleum, asphalt and their products into Canada during 1930. Importations during the year were valued at \$66,619,649 as compared with \$77,839,410 in 1929. Canada's supply of imported crude petroleum was drawn from the following sources, the United States, 19,773,625 barrels, Venezuela, 3,774,015 barrels, Colombia, 3,267,905 barrels, and Peru, 2,099,585 barrels. Gasoline importations totalled 163.4 million gallons of which the United States supplied 92.5 per cent and Dutch West Indies, 7.5 per cent. Fuel oil imports at 97.8 million gallons were 2.2 per cent above the 1929 level; the United States, Dutch West Indies, Peru and Mexico were the sources of these importations.

Exports of petroleum and its products were valued at \$2,441,632 or 10.5 per cent below the 1929 total of \$2,728,072. Gasoline accounted for 50.2 per cent of the value of the 1930 exports, fuel oil 36.1 per cent, kerosene 5.7 per cent, other oils 4.9 per cent, and wax 3.1 per cent.

Capital actually employed in operating and drilling oil wells in Canada in 1930 was recorded at \$63,300,244. This industry furnished employment to 1,869 salaried employees and wage-earners, who received \$3,337,754. Fuel and electricity used during the year represented an expenditure of \$363,998. Primary power employed consisted of 150 units with a total rating of 9,035 h.p., in addition to which 92 electric motors rated at 876 h.p. were in use.

Table 217.—Production of Crude Petroleum in Canada by Provinces, 1920-1930

(For the years 1881 to 1919 see Mineral Production of Canada 1928.)

(Barrel = 35 Imp. gal.)

Year	New Brunswick		Ontario		Alberta		Canada	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$		\$
1920.....	5,148	19,963	180,071	726,286	11,032	75,986	196,251	822,235
1921.....	7,479	33,022	172,859	559,198	7,203	49,313	187,541	641,533
1922.....	7,778	32,732	164,731	526,316	6,559	52,128	179,068	611,176
1923.....	8,826	35,642	159,400	478,149	1,943	8,227	170,169	522,018
1924.....	5,561	21,313	154,368	441,952	844	4,135	160,773	467,400
1925.....	5,376	18,756	143,134	386,555	183,491	845,394	332,001	1,250,705
1926.....	10,544	29,940	137,850	379,221	216,050	902,504	364,444	1,311,665
1927.....	18,244	41,748	139,606	288,347	318,741	1,185,948	476,591	1,516,043
1928.....	8,043	21,391	134,094	249,737	482,047	1,764,172	624,184	2,035,300
1929.....	7,499	19,909	121,194	253,678	988,675	3,458,177	1,117,368	3,731,764
1930.....	6,758	17,378	117,302	235,746	1,398,160	4,780,696	1,522,220	5,033,820

Table 218.—Production of Crude Petroleum in Canada, by Provinces, 1929 and 1930

Provinces	1929		1930	
	Barrels	Total value	Barrels	Total value
		\$		\$
NEW BRUNSWICK.....	7,499	19,909	6,758	17,378
ONTARIO—				
Petrolia and Enniskillen.....	56,284	116,556	55,126	109,741
Oil Springs.....	30,789	65,915	29,160	60,038
Moore Township.....	1,230	2,547	1,691	3,366
Sarnia Township.....	749	1,551	1,036	2,063
Plympton Township.....	315	652	296	589
Bothwell.....	23,236	48,118	21,177	42,115
West Dover.....	715	1,481	457	909
Onondaga.....	311	1,192	231	762
Moza Township.....	6,851	14,187	7,166	14,252
Thamesville.....	427	884	447	889
Tilbury East.....	139	288	149	296
Dutton.....			366	726
Dunwich.....	148	307		
Total for Ontario.....	121,194	253,678	117,802	235,746
ALBERTA—				
Turner Valley.....	971,821	3,440,821	1,340,428	4,695,762
Wainwright-Ribstone.....	14,093	13,400	57,732	84,934
Red Coulee, Fuego and Skiff.....	2,761	3,956		
Total for Alberta.....	988,675	3,458,177	1,398,160	4,780,696
Canada.....	1,117,368	3,731,764	1,522,220	5,033,820

Table 219.—Petroleum Wells in Canada, by Provinces, 1928, 1929 and 1930

		New Brunswick	Ontario	Alberta	Canada
Productive wells at beginning of year.....	1928	23	2,669	19	2,711
	1929	25	2,643	31	2,699
	1930	25	2,443	54	2,522
Number of productive wells drilled.....	1928	2	3	13	18
	1929		1	24	25
	1930	1	25	41	67
Number of wells abandoned.....	1928		91	2	93
	1929		146	8	154
	1930		53	3	56
Number of dry wells drilled.....	1928			6	6
	1929		13	7	20
	1930			12	12
Number of productive wells in operation at end of year.....	1928	25	2,643	31	2,699
	1929	25	2,443	54	2,522
	1930	26	2,150	89	2,265

Table 220.—Imports into Canada and Exports of Petroleum, Asphalt and their Products 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
IMPORTS—		\$		\$		\$
ASPHALT AND ITS PRODUCTS						
Asphaltum, or asphalt, solid..... tons	47,991	822,425	53,750	829,328	42,792	650,837
Asphalt, not solid.....		46,890		99,704		98,458
Asphaltum oil for paving purposes.....		95,562		23,448		70,130
CRUDE PETROLEUM, FUEL AND GAS OILS						
Crude petroleum in its natural state, .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories..... gals.	853,889,703	35,237,350	1,060,000,971	46,154,347	1,012,029,544	38,241,270
Crude petroleum, gas oils other than naphtha, benzine and gasoline lighter than .8235 but not less than .775 specific gravity at 60 degrees..... gals.	247,624	20,269	182,035	19,599	539,045	58,593
Petroleum, crude, not in its natural state, .725 specific gravity or heavier but not heavier than .770 specific gravity at 60 degrees temperature, when imported by oil refiners to be refined in their own factories..... gals.	263,771	26,378	5,726,147	376,001	8,466,369	600,899
Petroleum (not including crude petroleum imported to be refined or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature..... gals.	62,680,093	2,452,504	63,264,841	2,444,259	65,733,147	2,406,223
Petroleum, and other oils, imported by miners or mining companies or concerns for use in the concentration of ores of metals in their own concentrating establishments..... gals.	236,516	66,727	144,890	81,691	134,001	55,242
Fuel oil, ex-warehoused for ships' stores..... gals.	32,539,383	981,622	32,302,642	868,925	31,560,548	821,313
KEROSENE AND ILLUMINATING OILS						
Coal oil and kerosene, distilled, purified or refined, n.o.p..... gals.	3,950,094	353,339	4,506,255	398,010	4,911,647	360,518
Illuminating oils, composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon..... gals.	3,952	2,959	9,486	3,910	10,687	4,660
Coal oil and kerosene, distilled, known as "engine distillate", when .725 specific gravity and heavier, but not heavier than .770 specific gravity at 60 degrees temperature..... gals.	14,598	1,588	17,092	1,714	64,757	9,856
LUBRICATING OILS						
Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon..... gals.	6,797,536	1,144,645	7,369,099	1,289,594	8,048,755	1,477,639
Lubricating oils, n.o.p..... gals.	8,690,409	3,357,818	10,035,095	4,155,353	8,261,051	3,540,113
GASOLINE AND OTHER OILS						
Gasoline under .725 specific gravity at 60 degrees temperature..... gals.	116,062,590	13,526,618	135,558,699	15,096,277	93,822,017	9,488,190
Gasoline .725 specific gravity and heavier, but not heavier than .770 specific gravity at 60 degrees temperature..... gals.	27,531,961	3,278,465	39,551,756	4,702,487	49,953,335	5,712,502
Natural casinghead compression or absorption gasoline lighter than .6690 specific gravity at 60 degrees temperature, when imported by distillers of petroleum for blending with other gasolines distilled in Canada. (From Sept. 17, 1930)..... gals.					9,140,726	784,525
Gasoline, n.o.p..... gals.	58,565	7,335	41,115	5,322	10,530,470	1,129,284
All other oils, n.o.p..... gals.	211,832	149,548	194,794	137,337	308,019	131,324
OTHER PRODUCTS OF PETROLEUM						
Grease, axle..... lb.	5,245,699	293,682	7,010,528	383,513	5,341,098	288,994
Paraffine wax..... lb.	2,247,547	107,223	3,299,236	135,169	3,464,085	126,770
Paraffine wax candles..... lb.	396,717	88,798	393,158	85,543	383,063	79,766
Vaseline and all similar preparations of petroleum for toilet, medicinal or other purposes.....		240,966		250,753		230,800
Petroleum, products of, n.o.p..... gals.	1,860,009	332,155	1,828,536	297,126	1,667,160	251,743
Total.....		62,634,866		77,839,410		66,619,649
EXPORTS—						
Oil petroleum, crude..... gals.	21,531,929	1,098,586	28,177,495	1,548,288	19,259,585	881,452
Oil, coal and kerosene, refined..... gals.	1,297,081	127,391	1,367,241	137,160	1,460,676	138,455
Oil, gasoline and naphtha..... gals.	3,957,557	686,256	4,669,078	875,027	7,256,557	1,226,561
Oil, mineral, n.o.p..... gals.	279,946	85,014	433,634	105,426	315,779	120,231
Wax, mineral..... cwt.	10,010	54,501	11,556	62,171	16,958	74,933
Total.....		2,051,748		2,728,072		2,441,632

Table 221.—World Production of Crude Petroleum

(Supplied by *Imperial Institute*)

(Long tons)

	1928	1929	1930
BRITISH EMPIRE			
United Kingdom (estimated) (c).....	169,000	166,000	164,000
Canada (b).....	79,011	141,439	188,920
Barbados.....	1,213	1,357	(a)
Trinidad (b).....	1,052,664	1,193,925	1,290,261
British Borneo (Sarawak).....	739,227	748,405	691,656
India (b).....	1,181,250	1,182,039	1,200,838
Total.....	3,220,000	3,430,000	3,540,000
FOREIGN COUNTRIES			
Czechoslovakia.....	13,709	13,645	22,436
Estonia (c).....	6,491	4,586	9,847
France.....	77,922	78,025	80,564
Germany.....	90,591	101,242	171,575
Italy.....	5,899	5,793	7,668
Poland.....	731,163	664,033	652,296
Roumania.....	4,214,743	4,760,581	5,700,830
Russia (years ended Sept. 30).....	11,545,703	13,419,000	16,706,000
Algeria.....	1,205	3,000	2,376
Egypt.....	264,085	267,816	280,585
Morocco (French).....	40	40	(a)
Mexico (b).....	7,598,578	6,770,876	5,850,462
United States (b).....	121,820,800	136,124,700	121,116,900
Argentina.....	1,459,600	1,319,074	1,252,722
Colombia (b).....	2,802,365	2,870,980	2,865,600
Ecuador.....	153,500	188,421	212,031
Peru.....	1,566,416	1,748,697	1,750,058
Venezuela.....	15,077,493	19,531,514	19,835,609
Formosa (b).....	15,123	9,253	(d)
Iraq.....	93,000	118,986	119,567
Japan.....	262,420	253,082	274,638
Netherlands East Indies.....	4,239,682	5,155,807	5,444,082
Persia.....	5,700,000	5,718,745	5,940,979
Total.....	177,700,000	199,300,000	188,100,000
World's Total.....	180,900,000	202,700,000	191,600,000

(a) Information not available.

(b) The following conversion rates have been used: 35 gallons = 1 barrel and the undermentioned barrels = 1 ton:—Canada, 7·9, Mexico 6·6, Trinidad 7·3, India 7·4, United States 7·4, Colombia 7·1, Formosa 7·0.

(c) Including shale oil.

(d) Included with Japan.

Table 222.—Capital Employed in the Petroleum Industry in Canada, by Provinces, 1929 and 1930

	1929				1930			
	Ontario	Saskatchewan	Alberta	Canada	Ontario	Saskatchewan	Alberta	Canada
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant machinery and tools.....	1,940,658	397,161	43,638,703	45,976,522	1,527,737	181,117	52,902,369	54,611,223
Cost of supplies and stocks on hand.....	23,132	3,632	1,669,549	1,696,313	15,891	6,000	1,860,003	1,881,894
Cash, trading and operating accounts and bills receivable.....	27,011	811	6,825,741	6,853,563	2,393	11,481	6,793,253	6,807,127
Total.....	1,990,801	401,604	52,133,993	54,526,398	1,546,021	198,598	61,555,625	63,300,244

Table 223.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1929					\$	\$	\$
Ontario.....	14	1	119	134	11,753	91,766	103,519
Saskatchewan.....	4	.....	41	45	2,070	72,270	74,340
Alberta.....	160	54	1,828	2,042	369,667	3,201,163	3,570,830
Canada.....	178	55	1,988	2,221	383,490	3,365,199	3,748,689
1930							
Ontario.....	13	1	111	125	10,750	84,202	94,952
Manitoba and Saskatchewan.....	1	.....	22	23	900	20,878	21,778
Alberta.....	188	42	1,491	1,721	447,762	2,773,262	3,221,024
Canada.....	202	43	1,624	1,869	459,412	2,878,342	3,337,754

*See footnote on page 37.

Table 224.—Wage-Earners in the Petroleum Industry in Canada, by Provinces and by Months, 1929 and 1930

Month	1929				1930			
	Ontario	Saskatchewan	Alberta	Canada	Ontario	Saskatchewan	Alberta	Canada
January.....	107	21	780	908	96	.....	1,464	1,560
February.....	107	7	769	883	97	.....	1,354	1,451
March.....	107	7	793	907	97	.....	1,430	1,527
April.....	109	39	1,008	1,156	103	12	1,416	1,531
May.....	117	31	1,331	1,479	108	13	1,384	1,505
June.....	120	15	1,698	1,833	113	15	1,473	1,601
July.....	115	15	1,811	1,941	109	12	1,338	1,459
August.....	113	15	2,027	2,155	108	12	1,295	1,415
September.....	107	24	2,040	2,171	100	12	1,161	1,273
October.....	105	24	2,058	2,187	101	16	1,213	1,330
November.....	99	15	1,946	2,060	101	14	1,208	1,323
December.....	98	9	1,658	1,765	100	10	1,158	1,268

Table 225.—Casing used in the Petroleum Industry in Alberta, 1930

Size	Weight	Length	Size	Weight	Length
Inches	Pounds	Feet	Inches	Pounds	Feet
4½.....	12,130	1,213	11½.....	181,329	3,002
4¾.....	196,720	12,295	12½.....	713,126	13,845
4¾.....	71,536	4,471	13.....	56,912	1,138
5.....	344,036	19,070	13½.....	2,219,652	40,558
5½.....	8,280	414	15.....	10,205	157
6.....	254,984	9,128	15½.....	955,796	13,032
6½.....	1,514,498	54,183	16.....	994,828	13,555
6½.....	1,428,602	51,021	16½.....	3,975	53
8.....	161,976	5,042	18.....	28,320	328
8½.....	194,148	5,393	18½.....	387,686	4,635
8½.....	1,565,744	45,626	20.....	110,070	1,223
8½.....	344,340	9,565	20½.....	9,900	110
8½.....	1,818,267	50,945	21½.....	95,081	928
10.....	1,216,727	26,914	24.....	15,840	144
10½.....	113,750	2,500	24½.....	12,789	127
10½.....	1,576,787	35,148			
Total.....				16,618,034	425,853

2. The Petroleum Products Industry in Canada

Fifteen plants in Canada were engaged during 1930 in the refining of oils for the production of gasoline, fuel oil, kerosene, lubricating oils, asphalt, waxes, petroleum coke, and grease. These refineries were located at strategic points across the Dominion for convenience in marketing their products. During 1930 the Canadian refineries treated 51.5 million gallons of oil from Canadian wells (including naphtha from the Turner Valley field in Alberta), and 1,012.9 million gallons of oil imported chiefly from the United States, Peru and Colombia. Gasoline production amounted to 445.6 million gallons, of which 38 per cent or 169.3 million gallons were made by the cracking process. Sales of fuel and gas oils totalled 375.3 millions; in addition to which the refineries used 59.3 million gallons for fuel purposes.

Thirteen plants were engaged in compounding lubricating oils and greases in 1930. The total production of these plants was valued at \$977,494.

Capital employed in Canada's petroleum refining and lubricating oil compounding industries in 1930 totalled \$70,334,381. Salaries and wages paid to the 5,134 employees amounted to \$8,190,130. Fuel and electricity used during the year cost \$3,868,544. The total cost of materials used in 1930 was \$71,800,429.

Table 226.—Materials Used and Products Made by the Oil Refineries of Canada, 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
MATERIALS USED—		\$		\$		\$
Petroleum refining—						
Crude oil, product of Canadian wells.....imp. gal.	20,324,814	2,112,314	37,338,402	4,026,272	51,522,864	5,410,237
Crude oil, imported.....imp. gal.	829,608,956	50,952,144	1,035,490,094	68,082,715	1,012,912,110	62,230,738
Imported fuel and gas oils for use in cracking process.....imp. gal.			440,475	18,270		
Sulphuric acid (66° Bé) (Not made by firm reporting).....lb.	51,828,643	408,905	49,610,612	425,853	49,250,621	447,382
Sulphur (not used in acid manufacture).....lb.	161,044	5,105	201,032	6,770	901,759	37,959
Caustic soda.....lb.	4,345,466	159,803	6,699,874	243,319	5,801,722	201,420
Soda ash.....lb.	381,196	8,023	404,185	9,315	352,841	8,285
Litharge.....lb.	659,882	57,527	799,464	69,698	498,055	41,696
Fullers' earth.....lb.	11,707,839	109,221	18,513,820	207,931	20,102,387	241,793
Other materials.....		860,055		758,246		676,442
Shipping containers.....		2,360,088		2,440,793		2,011,927
Total.....		57,033,185		76,289,182		71,307,879
Lubricating oils and greases—Total.....		350,656		572,757		492,550
Grand total.....		57,383,841		76,861,939		71,800,429
PRODUCTS MADE—						
Petroleum refining—						
Made for sale—						
Gasoline (a) straight run.....imp. gal.	226,904,777	33,574,295	303,911,713	43,250,498	276,238,369	37,337,958
(b) by cracking process.....imp. gal.	117,175,542	18,647,134	132,646,696	20,242,805	169,314,761	23,445,341
Fuel and gas oils.....imp. gal.	309,185,187	12,543,505	387,069,829	15,586,290	375,255,886	14,231,129
V.M. & P. or solvent naphtha.....imp. gal.	4,949,743	643,350	7,257,910	974,348	7,150,672	870,037
Kerosene.....imp. gal.	55,939,530	7,335,353	49,297,417	6,870,711	43,509,487	5,378,830
Lubricating oils.....imp. gal.	19,022,749	3,340,097	22,900,238	3,943,418	18,042,269	2,909,506
Grease.....lb.	14,439,030	266,590	17,042,195	316,848	13,465,366	268,453
Tar.....lb.			1,032,500	8,260	1,017,500	8,140
Asphalt.....imp. gal.	22,326,606	2,016,630	35,233,347	2,688,579	37,470,666	1,931,629
Petroleum coke.....tons	80,361	467,548	84,108	465,753	68,549	392,945
Wax and candles.....lb	15,872,946	599,335	10,776,352	537,886	10,153,924	453,591
Other products.....		368,913		258,113		241,053
Total for sale.....		79,802,752		95,143,509		87,528,612
Made for own use:—						
Gasoline (a) straight run.....imp. gal.	49,542	7,413	62,205	8,813	46,287	6,273
Fuel and gas oils (except for cracking).....imp. gal.	52,206,663	1,907,829	61,629,931	2,308,963	59,308,393	2,197,389
V.M. & P. or solvent naphtha.....imp. gal.	9,728	1,376	11,371	1,490	14,288	1,690
Kerosene.....imp. gal.	42,389	5,191	64,964	8,763	97,394	13,022
Lubricating oils.....imp. gal.	26,297	3,884	24,960	4,191	42,621	6,384
Petroleum coke.....tons	15,547	93,882	25,408	140,230	23,538	124,363
Still gas.....M cu. ft.	2,489,346	572,847	3,140,187	708,781	3,529,319	874,151
Acid sludge.....		53,218		53,909		
Other products.....				5,531		57,827
Total for own use.....		2,645,640		3,240,671		3,281,099
Total Petroleum refining.....		82,448,392		98,384,180		90,809,711
Fuel and gas oils made and used in pressure cracking process.....imp. gal.	284,510,884		351,436,512		389,719,223	
Lubricating oils and greases—						
Lubricating oils.....imp. gal.	1,244,350	464,613	1,522,045	745,876	1,682,234	753,386
Lubricating greases.....lb.	657,708	82,269	688,384	92,004	977,868	102,127
Soaps.....lb.		70,859	465,064	66,395	374,854	34,841
Other products.....		56,039		119,859		87,140
Total lubricating oils and greases.....		673,780		1,024,134		977,494
Grand total.....		83,122,172		99,408,314		91,787,205

CHAPTER EIGHT

THE NON-METAL MINING INDUSTRIES IN CANADA. (Other than Fuels)

Including detailed data relating to operations in the following industries:—

Abrasives	Miscellaneous—	Manganese bog,
Asbestos	Actinolite	Mineral waters
Feldspar	Barytes	Natro-alunite
Gypsum	Bituminous sands	Phosphate
Iron oxides (ochre)	Fluorspar	Pyrites
Mica	Graphite	Silica brick
Quartz	Lithium minerals	Sodium carbonate
Salt	Magnesite	Sodium sulphate
Talc and soapstone	Magnesium sulphate	

(1) ABRASIVES, NATURAL

This group of industries includes those producing corundum, diatomite, garnets, grinding pebbles, grindstones, pulpstones and scythestones, and volcanic dust.

Corundum.—Corundum (Al_2O_3) crystals are found in an area embracing several townships in Renfrew and Hastings counties in the province of Ontario. The industry made its appearance there in 1900 and production reached a maximum in 1906. Corundum mining practically ceased with the perfection and production of artificial abrasives by the electric furnace. In 1921 grain corundum amounting to 403 tons valued at \$55,965 was exported to the United States; since that date no shipments of this mineral have been reported.

Diatomite.—Diatomite, also known as diatomaceous earth and Kieselguhr, is composed of silicious skeletons of algae. The largest deposits are of Tertiary age and occur commonly as massive chalk like beds, usually interstratified with thin seams of clay, sand, volcanic dust, flint, etc. These are typical of western North America. There are other or recent types of freshwater origin occurring under water or in bogs and swamps. All the known eastern Canadian and the majority of the eastern United States diatomite deposits are of the recent freshwater type.

The lightness and inertness of diatomite make it valuable for filtration and certain types of filling. Prior to 1928 the Canadian production of diatomite was obtained from deposits in the province of Nova Scotia. In 1896, shipments of diatomite totalling 644 tons were made; this was the first official record of production in Canada. Deposits at Silica lake and near St. Ann's Cape Breton, have been worked. Development of diatomite was carried on in 1926 at East New Annan, Nova Scotia, and in 1927 shipments of this material amounting to 266 tons were made.

In 1930 shipments were made from deposits at East New Annan, Nova Scotia, Muskoka Falls, Ontario and Quesnel, British Columbia. The total production for the year was 554 tons valued at \$13,247 as compared with 429 tons worth \$10,330 in 1929.

Its three major uses are: as a heat and sound insulator, as a filter medium and as an admixture in concrete. It is also used in the manufacture of hard asphaltum and rubber products, metal polishes, absorbents, etc.

Garnets.—A deposit of garnets in Ashby township, Ontario, was operated during 1923 and 1,250 tons of garnet concentrates and crude garnets were shipped to Niagara Falls, New York, for use as an abrasive material. In 1924, a shipment of 360 tons of garnets was made but there has been no production from this deposit since that year. In 1927, development work was conducted on a garnet deposit in Joly township, Labelle county, Quebec, and a shipment of two tons was made. Operations in the garnet mining industry in Canada during 1930 consisted of the partial development of a deposit in the Abitibi district in the province of Quebec.

Grinding Pebbles.—Grinding pebbles were obtained for a number of years near Jackfish, on the north shore of Lake Superior. During 1920 the production amounted to 560 tons; in 1925 the total was 105 tons and in 1926 shipments were considerably lower amounting to only 64 tons. No shipments have been made from Canadian deposits since 1926. Artificially rounded pebbles are now produced in Minnesota from massive flint.

Grindstones, Pulpstones and Scythestones.—In Nova Scotia at Lower Cove near Joggins and at Minudie, grindstones were produced as early as 1750. Production from these quarries is reported to have been over 4,000 tons annually for a number of years around 1850. Other sandstone deposits in Nova Scotia were worked near Pictou, Merigonish Harbour, Woodburn and Quarry Island. In New Brunswick quarries producing grindstones have been operated on Grindstone Island; and in the southern part of the peninsula between the Petitcodiac and Memramcook rivers. New Brunswick grindstone quarries in operation in 1871 employed 200 men earning \$30,635 and produced \$40,953 in products. In 1881 eight quarries were operated, seven in Gloucester county and one in Westmorland, with a capital investment of \$10,250; 136 men received \$20,975 in wages and the production was valued at \$30,297. The high record for the industry in New Brunswick was reached in 1907 when 4,833 tons were produced.

About 1830 the grey sandstones on the east side of Grindstone Island, the centre island of the Magdalen group in Quebec were worked by the French inhabitants and grindstones made for local use.

Some grindstones and scythestones were shipped between 1869 and 1875 from sandstone deposits in Clara and Nottawasago townships, Ontario.

A sandstone quarry situated on Newcastle Island, close to Nanaimo, British Columbia, commenced shipping pulpstones in 1923.

It is reported that the use of artificial pulpstones constructed of bonded silicon carbide segments is gradually increasing.

Volcanic Dust.—Volcanic dust is used for purposes similar to ground pumice, particularly in the manufacture of cleansers and scouring powders and in some instances as a substitute for fullers earth in the refining of hard oils and fats.

The extensive beds of volcanic dust near Waldeck, Saskatchewan, were discovered in 1918. Shipments have been made from these deposits annually for the past seven years. In 1930 production in Canada came entirely from these deposits and amounted to 242 tons valued at \$4,840 as compared with 300 tons at \$6,000 in 1929.

At Williams Lake, in British Columbia, a small tonnage of volcanic ash rock was mined during the year.

The ten firms operating in the natural abrasives industry in Canada during 1930 reported a capital investment of \$345,102; salaried employees and wage-earners totalled 45 with combined earnings amounting to \$42,867. Fuel and electricity costs were \$4,305.

Table 227.—Capital Employed in the Natural Abrasives Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	631,639	256,880
Cost of supplies and stocks on hand.....	72,785	30,295
Cash, trading and operating accounts and bills receivable.....	86,367	57,927
Total.....	790,791	345,102

Table 228.—Wage-Earners in the Natural Abrasives Industry in Canada, by Months, 1929 and 1930

Month	Number		Month	Number	
	1929	1930		1929	1930
January.....	83	15	July.....	213	40
February.....	94	10	August.....	189	54
March.....	97	9	September.....	158	32
April.....	109	11	October.....	135	33
May.....	175	35	November.....	76	20
June.....	176	39	December.....	22	13

Table 229.—Production of Corundum in Canada, 1900-1930

(Short tons)

Year	Corun- dum- bearing rock treated	Grain corun- dum graded	Per cent recovery	Shipments of grain corundum				Average price in cents per pound
				Sold in Canada	Exported	Total ship- ments	Total value	
	Tons	Tons		Tons	Tons	Tons	\$	
1900.....		60		3		3	300	5.00
1901.....	4,134	434	10.7	85	302	387	46,415	5.97
1902.....	7,996	805	10.1	106	662	768	84,465	5.49
1903.....	(a) 8,877	839	9.5	85	618	703	77,510	5.51
1904.....	28,187	1,654	5.9	116	877	993	109,545	5.51
1905.....	23,571	1,681	7.1	140	1,504	1,644	149,153	4.48
1906.....	45,719	2,914	6.4	162	2,112	2,274	204,973	4.50
1907.....	60,532	2,682	4.4	154	1,728	1,892	177,922	4.70
1908.....	2,678	101	4.0	99	990	1,089	100,398	4.60
1909.....	35,894	1,579	4.4	129	1,362	1,491	162,492	5.45
1910.....	37,183	1,686	4.5	106	1,764	1,870	198,680	5.31
1911.....	41,975	1,641	3.9	92	1,380	1,472	161,873	5.50
1912.....	36,879	1,620	4.4	63	1,897	1,960	239,091	6.10
1913.....	12,290	763	6.2	23	1,154	1,177	137,036	5.82
1914.....	12,111	695	5.7	14	534	548	72,176	6.59
1915.....	1,724	116	6.7	21	241	262	33,138	6.33
1916.....	1,864	67	3.6	8	59	67	10,307	7.65
1917.....	4,659	188	4.0	16	172	188	32,153	8.55
1918.....	3,184	137	4.3		137	137	26,112	9.90
1919.....	1,300	26	2.0					
1920.....	(b) 13,025	322	2.5	20	176	196	24,547	6.25
1921.....	(b) 11,256	407	3.6		403	403	55,965	6.94
1922-1930.....								
Total.....	395,038	20,422		1,452	18,072	19,524	2,104,251	

(a) In addition to this amount which was milled in Canada, 267 tons of ore were mined and shipped to the United States for treatment there.

(b) Tailings only.

Table 230.—Production of Diatomite in Canada, 1896-1930

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1896.....	644	9,960	1908.....	30	195	1920.....	260	8,600
1897.....	15	150	1909.....	.....	.....	1921.....	341	11,268
1898.....	1,017	16,660	1910.....	22	134	1922.....	219	5,781
1899.....	1,000	15,000	1911.....	20	122	1923.....	130	3,250
1900.....	336	1,950	1912.....	38	230	1924.....	33	833
1901.....	850	15,300	1913.....	620	12,138	1925-1926.....	.....	.....
1902.....	1,052	16,470	1914.....	650	13,000	1927.....	266	6,650
1903.....	835	16,700	1915.....	317	12,119	1928.....	368	8,960
1904.....	320	6,400	1916.....	620	12,139	1929.....	429	10,330
1905.....	300	3,600	1917.....	600	18,000	1930.....	554	13,247
1906.....	.....	.....	1918.....	500	12,500			
1907.....	30	225	1919.....	565	11,300	Total.....	12,981	263,216

Table 231.—Production of Grindstones in Canada, by Provinces, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada 1928)

Year	Nova Scotia		New Brunswick		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1921.....	183	6,990	881	33,647	1,064	40,637
1922.....	102	3,692	735	26,600	837	30,292
1923.....	254	7,906	1,463	43,577	1,717	51,483
1924.....	338	12,525	1,693	56,586	2,031	69,111
1925.....	439	16,723	1,296	45,061	1,735	61,784
1926.....	311	15,136	1,202	43,850	1,513	58,986
1927.....	11	220	1,306	47,255	1,317	47,475
1928.....			1,250	45,901	1,250	45,901
1929.....	6	110	1,032	37,291	1,038	37,401
1930.....	6	110	229	9,764	235	9,874

Table 232.—Production of Pulpstones and Sharpening Stones in Canada, 1921-1930

(For the years 1892 to 1920 see Mineral Production of Canada 1928)

Year	Pulpstones		Sharpening stones	
	Tons	Value	Tons	Value
		\$		\$
1921.....	200	22,000	17	1,430
1922.....	150	12,000	18	1,450
1923.....	260	25,100	35	3,500
1924.....	624	58,113	36	3,600
1925.....	781	57,781	46	4,600
1926.....	1,155	89,541	27	2,700
1927.....	911	75,242	23	2,300
1928.....	581	52,659	24	2,400
1929.....	754	62,333	155	6,617
1930.....	573	49,897	22	2,250

Table 233.—Production of Grindstones, Pulpstones and Scythestones in Canada, by Provinces, 1928-1930

Province	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Nova Scotia.....			6	110	6	110
New Brunswick.....	1,609	80,451	1,731	103,514	495	35,689
British Columbia.....	246	20,509	210	2,730	329	26,222
Total.....	1,855	100,960	1,947	106,354	830	62,021

Table 234.—Imports into Canada and Exports of Abrasives, 1928-1930

Item	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
IMPORTS—						
Abrasives—						
Artificial abrasives in bulk, crushed or ground, when imported for use in the manufacture of abrasive wheels and polishing composition.....		244,771		251,704		205,042
Carborundum wheels or stones not further manufactured than moulded and burned.....		222,386		219,475		57,731
Diamond dust or bort, and black diamonds for borers.....		2,281,249		2,727,285		1,440,871
Diatomaceous earth or infusorial earth (Kieselguhr) ground or unground (from April 1, 1928).....cwt.	5,354	9,594	23,857	40,539	6,582	12,004
Emery in bulk, crushed or ground.....		53,289		54,433		37,353
Grinding wheels, manufactured by bonding together of either natural or artificial abrasives.....		109,185		133,779		150,503
Grinding stones or blocks manufactured by the bonding together of either natural or artificial abrasives.....		83,942		99,036		127,795
Grindstones, not mounted, and not less than 36 inches in diameter.....		612,792		424,613		229,436
Grindstones, n.o.p.....		40,598		23,769		12,134
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		48,062		35,955		36,089
Sand paper, glass, flint and emery paper or emery cloth.....		423,357		498,328		342,771
Iron sand or globules or iron shot and dry putty, for use in polishing glass or granite, or for sawing stone.....		18,110		41,934		41,758
Manufactures of emery or of artificial abrasives, n.o.p.....						*60
Burrstones in blocks, rough or unmanufactured, not bound up or prepared for binding into mill-stones.....No.	119	925	30	1,310	21	1,007
Total.....		4,148,260		4,552,160		2,694,554
EXPORTS—						
Grindstones, manufactured.....		28,747		36,536		11,674
Abrasives—						
Natural, n.o.p.....cwt.	5,871	7,071	8,287	9,757	7,455	8,972
Artificial, crude, including carborundum.....cwt.	1,235,302	3,295,460	1,571,816	3,815,804	1,128,775	2,842,289
Artificial, made up into wheels, stones, etc.....		63,745		53,666		36,489
Total.....		3,395,023		3,915,763		2,899,424

*April to December 1930.

2. ABRASIVES, ARTIFICIAL, AND ABRASIVE PRODUCTS

Manufactures of artificial abrasives and abrasive products in Canada were valued at \$6,450,351 in 1930. This output was 28 per cent less than the corresponding value or \$8,961,951 in 1929. Among the principal products made in this industry were 42,894 tons of fused alumina at \$3,376,908 and 22,778 tons of silicon carbide at \$2,111,476, abrasive wheels worth \$547,276, and other commodities such as ferro-silicon, abrasive cloth and paper, pulpstones and sharpening stones, files and magnesia.

For 1930, reports were received from 13 plants of which 12 were in Ontario and 1 in Quebec. Capital employed by these firms amounted to \$6,251,425 distributed as follows: cost of lands, buildings, equipment, etc., \$3,331,763; supplies and stock on hand, \$2,114,862; cash, trading and operating accounts and bills receivable, \$804,800. The average number of employees was 799 and salaries and wages for the year totalled \$1,156,641. Materials used in manufacturing cost \$2,313,310 at the works, and the value added by manufacturing processes was \$4,137,041.

ASBESTOS

Asbestos was discovered in the Des Plantes river region, between St. Joseph and St. Francis villages, Quebec, about 1862. Operation of these deposits was found, however, to be unprofitable owing to their limited character.

The succeeding discoveries of the mineral were made in the district of Thetford and Coleraine in 1877. In the following year mining was commenced on a small scale and some fifty tons were extracted. An excellent fibre was produced but it was difficult to obtain a market.

In the course of the next twelve years development in the industry was rapid. Seven quarries were in operation in 1885 and the exports during that year totalled 2,440 tons. First quality asbestos then sold for \$80 per ton. Following this, a gradual increase in price is recorded until in 1900 the annual production of 29,141 tons of this same grade sold for \$300 per ton. In 1920, there were 18 mines in operation, the quantity sold was 199,573 tons valued at \$14,792,201, employees totalled 3,572, and \$4,765,305 were distributed in wages.

Canada's exports of non-fabricated asbestos (including sand and waste) in 1930 consisted of 235,500 tons and comprised shipments of 6,632 tons to Great Britain, 188,462 tons to the United States, 481 tons to Australia, 11,978 tons to Belgium, 5,545 tons to France, 6,588 tons to Germany, 3,076 tons to Italy, 8,605 tons to Japan, 2,391 tons to the Netherlands, and smaller tonnages to Argentina, Spain, Peru, and India.

Seven companies operated in the asbestos mining industry in 1930 and reported fixed and current assets of \$35,097,872. Employment was supplied to 230 on salary and 2,540 on wages; their combined earnings amounted to \$3,474,215. Fuel and electricity used during the year required an expenditure of \$1,133,737 of which amount \$733,380 was the cost of 68,657,357 k.w.h. of electricity.

Sales of asbestos in 1930 totalled 242,114 tons valued at \$8,390,163 as compared with 306,055 tons worth \$13,172,581 during 1929. This production represents a decrease of 20.9 per cent in quantity and 36.3 per cent in value below the high record output of the previous year. Asbestos rock mined in 1930 amounted to 4,901,206 tons of which 3,737,780 tons were milled.

Some of the producing mines closed down during the year and there was an almost general curtailment of mining operations throughout the Quebec asbestos areas. Canadian asbestos is not only competing with an increasing production from South Africa but also with the longer fibre grades from Russia.

It is interesting to note that the Russian Soviet output of asbestos sheets, asbestos products and asbestite is now greater than that of pre-war years.

The Department of Mines, Southern Rhodesia, reports a 1930 production of 37,766 tons of asbestos valued at £1,070,847 this, in contrast with the previous year, shows a decrease of 4,868 tons and £115,780 in value.

In the United States the commercial production of asbestos increased 84 per cent in quantity but declined 14 per cent in total value as in comparison with 1929. The total quantity of this mineral sold or used by United States producers amounted to 3,653 short tons valued at \$273,292.

During 1930 a total of 11 plants in Canada manufactured asbestos products. These manufactures included brake linings, boiler and pipe covering, packings, shingles, lumber, paper, clutch facings, blackboards, etc. Of the works, 4 were in Quebec, 4 in Ontario, 2 in British Columbia, and 1 in Nova Scotia. Total production was valued at \$2,301,924.

Table 235.—*Production of Asbestos in Canada, 1921-1930

(For the years 1880 to 1920 see Mineral Production of Canada, 1928)

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1921.....	92,761	4,906,230	1926.....	279,403	10,099,423
1922.....	163,706	5,552,723	1927.....	274,778	10,621,013
1923.....	231,482	7,522,506	1928.....	273,033	11,238,360
1924.....	225,744	6,710,830	1929.....	306,055	13,172,581
1925.....	273,524	8,977,546	1930.....	242,114	8,390,163

*Sales.

Table 236.—Mill Output and Shipments of Canadian Asbestos, 1929 and 1930

Classification	1929				1930			
	Total output	Sold or shipped			Total output	Sold or shipped		
		Quantity	Total sales	Average		Quantity	Total sales	Average
			value at mill	value per ton			value at mill	value per ton
	Tons	Tons	\$	\$	Tons	Tons	\$	\$
Crude No. 1.....	883	802	447,259	557.68	653	720	345,750	480.21
Crude No. 2.....	2,864	2,625	870,888	331.77	2,882	1,440	411,179	285.54
Other crudes.....	1,053	931	168,226	180.69	436	161	10,914	67.79
Spinning stocks.....	19,615	17,545	3,110,848	177.31	14,432	10,411	1,473,522	141.52
Shingle stocks.....	34,038	34,177	2,572,216	75.26	22,590	19,909	1,406,385	70.64
Mill board and paper stocks.....	91,892	91,157	3,515,209	38.56	80,129	79,739	2,817,295	35.33
Fillers, floats and other short fibres.....	167,859	158,818	2,487,935	15.66	119,290	129,734	1,925,118	14.84
Total.....	311,204	306,055	13,173,581	.....	249,412	242,114	8,390,163	.....
Sand and gravel*.....	18,976	18,976	7,303	0.33	40,729	40,309	12,413	0.31

*This production has been included under the "Sand and Gravel Industry."

Table 237.—Imports of Asbestos into Canada, 1928-1930

Item	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
Asbestos in any form other than crude, and all manufactures of, n.o.p.....		\$ 727,843		\$ 897,229		\$ 597,915
Asbestos packing.....	101	108,044	113	116,207	87	82,111
Asbestos brake and clutch lining.....						193,824
Total.....		835,887		1,013,436		873,850

Table 238.—Exports of Canadian Asbestos by Countries of Destination, 1928-1930

Commodity and Destination	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
ASBESTOS—				\$		\$
Great Britain.....	6,886	547,250	3,508	350,410	3,528	288,531
United States.....	80,765	5,157,955	91,876	6,033,946	66,857	3,723,462
Australia.....	1,390	104,275	1,463	137,087	481	47,979
Belgium.....	3,841	309,149	14,291	987,896	10,836	769,002
France.....	7,012	505,825	6,583	504,539	5,545	389,890
Germany.....	13,589	1,153,177	11,329	1,189,580	4,278	410,083
Italy.....	3,431	295,148	2,424	234,971	3,076	274,162
Japan.....	9,165	507,758	10,557	567,800	8,605	476,199
Netherlands.....	2,464	168,289	1,240	87,210	1,024	60,971
Spain.....	431	33,055	92	6,560	32	1,660
Other countries.....	218	19,677	362	27,209	.....	.....
Total.....	129,192	8,802,558	143,725	10,127,208	104,262	6,441,939
SAND AND WASTE—						
Great Britain.....	1,964	40,727	2,335	55,850	3,104	75,539
United States.....	123,417	1,960,491	140,588	2,320,084	121,605	1,791,306
Germany.....	3,460	84,950	2,667	66,625	2,310	51,115
Netherlands.....	1,988	48,900	1,201	30,025	1,367	31,590
Other countries.....	1,900	42,661	1,514	34,890	2,852	61,768
Total.....	135,729	2,177,729	148,305	2,507,474	131,238	2,011,318
ASBESTOS MANUFACTURES INCLUDING ASBESTOS ROOFING—						
Great Britain.....		7,738		58,769		139,460
United States.....		22,711		21,556		14,204
British South Africa.....						198
Newfoundland.....		5,765		4,707		15,203
New Zealand.....		1,571		592		735
Other countries.....		28,110		28,328		29,983
Total.....		65,895		113,952		199,783

Table 239.—Monthly Average Prices of Asbestos by Grades, 1929 and 1930

(Per short ton)

(Computed from quotations in the *Engineering and Mining Journal*)

Month	Crude No. 1	Crude No. 2	Spin- ning fibres	Magnesia and compressed sheet fibres	Shingle stock	Paper stock	Cement stock	Short fibres	Floats
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1929									
January.....	650	512	250	200	85	47	25	15	13
February.....	650	512	250	200	85	47	25	15	13
March.....	650	512	250	200	85	47	25	15	13
April.....	650	512	250	200	85	47	25	15	13
May.....	650	512	250	200	85	47	25	15	13
June.....	650	512	250	200	85	47	25	15	13
July.....	650	512	250	200	85	47	25	15	13
August.....	650	512	250	200	85	47	25	15	13
September.....	650	512	250	200	85	47	25	15	13
October.....	650	512	250	200	85	47	25	15	13
November.....	650	512	250	200	85	47	25	15	13
December.....	650	512	250	200	85	47	25	15	13
Average.....	650	512	250	200	85	47	25	15	13
1930									
January.....	650	512	250	200	85	47	20	15	13
February.....	525	350	162	117	67	37	20	12	13
March.....	525	350	162	117	67	37	20	12	13
April.....	525	350	162	117	67	37	20	12	13
May.....	525	350	162	117	67	37	20	12	13
June.....	525	350	162	117	67	37	20	12	13
July.....	525	350	162	117	67	37	20	12	13
August.....	525	350	162	117	67	37	20	12	13
September.....	525	350	162	117	67	37	20	12	13
October.....	425	300	162	117	57	33	17	12	11
November.....	375	262	162	112	55	32	17	.....	11
December.....	375	262	162	112	55	32	17	.....	11
Average.....	502	345	169	123	66	37	19	12	12.50

Table 240.—Capital Employed in the Asbestos Industry in Canada, 1928-1930

	1928	1929	1930
	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—			
Cost of lands, buildings, machinery and tools.....	32,262,729	29,776,658	32,304,389
Cost of supplies and stocks on hand.....	1,850,799	1,893,501	1,884,669
Cash, trading and operating accounts and bills receivable.....	1,591,684	1,578,798	908,814
Total.....	35,705,212	33,248,957	35,097,872

Table 241.—Employees, Salaries and Wages in the Asbestos Industry in Canada, 1929 and 1930

	1929				1930			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried Employees.....	172	25	197	419,799	195	35	230	475,167
Wage-Earners—								
Mine.....	1,835	.....	1,835	.....	1,384	.....	1,384	.....
Mill.....	1,359	.....	1,359	.....	1,156	.....	1,156	.....
Total.....	3,194	.....	3,194	3,990,736	2,540	.....	2,540	2,999,048
Grand total.....	3,366	25	3,391	4,410,535	2,735	35	2,770	3,474,215

Table 242.—Wage-Earners in the Asbestos Industry in Canada by Months, 1929 and 1930

Month	1929		1930		Month	1929		1930	
	Mine	Mill	Mine	Mill		Mine	Mill	Mine	Mill
January.....	1,491	1,095	1,573	1,267	July.....	1,931	1,441	1,295	1,113
February.....	1,659	1,168	1,652	1,268	August.....	1,912	1,451	1,302	1,110
March.....	1,761	1,294	1,661	1,328	September.....	1,944	1,499	1,269	1,116
April.....	1,733	1,271	1,368	1,176	October.....	1,947	1,454	1,244	1,052
May.....	1,816	1,400	1,356	1,108	November.....	1,957	1,457	1,263	1,107
June.....	1,867	1,388	1,287	1,072	December.....	1,943	1,434	1,107	1,066

Table 243.—World Production of Asbestos, 1928-1930

(Supplied by *Imperial Institute*)

(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
Southern Rhodesia.....	35,679	38,066	33,720
Union of South Africa.....	24,197	28,717	23,083
Canada—			
Chrysotile (including sand, etc.).....	265,452	294,804	251,019
Actinolite.....	63	27	30
Cyprus.....	16,287	14,110	7,256
India.....	157	318	33
Australia.....	12	256	82
Total.....	342,000	376,000	315,000
FOREIGN COUNTRIES			
Finland.....	2,241	1,600	1,061
France.....	720	740	(a)
Italy.....	4,724	2,586	710
Russia (years ended Sept. 30).....	26,074	29,054	56,000
Portuguese East Africa.....			16
United States (Sales)—			
Amphibole.....		1,046	526
Chrysotile.....	1,999	1,771	3,262
Japan (estimated).....	1,000	1,000	1,000
Manchuria.....	(a)	111	(a)
Total.....	37,000	38,000	64,000
World's Total.....	379,000	414,000	379,000

(a) Information not available.

FELDSPAR

The first record of production in the feldspar industry in Canada dates back to about 1890, approximately 700 tons were mined in that year. This was followed by an increase until the maximum output of 44,804 tons was reached in 1924.

All of the feldspar mined in Canada is of the potash variety known as orthoclase or microcline, albite a soda feldspar also occurs; there is, however, little demand for this mineral.

In 1930 the principal Feldspar productions came from the Hybla, Perth and Verona areas in Ontario, and Aylwin township and the Buckingham area in Quebec. The latter field became prominent in 1921 with the successful development of several high grade feldspar properties. An output of 10,000 tons in that year is recorded from one of these quarries.

Production in 1930 amounted to 26,796 tons valued at \$268,469 as against 37,527 tons worth \$340,471 in 1929.

Crude feldspar exported from Canada during 1930 totalled 21,183 tons valued at \$165,482, of this quantity 21,133 tons were consigned to the United States. Total imports of crude and ground feldspar in 1930 totalled 3,177 tons appraised at \$53,341 as against 3,955 tons at \$65,997 in 1929.

Feldspar is used in the manufacture of tableware, electric porcelain, floor and wall tile, enamels, stucco, bottle glass, and scouring compounds. In the autumn of 1930 the Canadian Flint and Spar Co. Ltd., completed the erection of a modern grinding mill at Buckingham, P.Q. A feldspar grinding plant is also operated in Kingston, Ontario by the Frontenac Floor and Wall Tile Co. Ltd.

Table 244.—Production of Feldspar in Canada, by Provinces, 1921-1930

(For the years 1890-1920 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1921.....	9,737	80,180	20,115	150,457	†29,865	†230,754
1922.....	12,472	127,826	15,255	120,576	27,727	248,402
1923.....	12,026	102,779	17,199	134,822	29,225	237,601
1924.....	16,147	142,118	28,657	216,422	44,804	358,540
1925.....	11,287	94,730	17,394	141,059	28,681	235,789
1926.....	13,168	111,136	22,783	199,102	35,951	310,238
1927.....	12,730	104,618	17,119	154,533	29,849	259,151
1928.....	12,943	104,789	18,954	180,153	31,897	284,942
1929.....	15,790	133,492	21,737	206,979	37,527	340,471
1930.....	17,074	163,802	9,722	104,667	26,796	268,469

†Includes Nova Scotia production of 16 tons valued at \$117.

Table 245.—Production in Canada, Imports and Exports of Feldspar, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	12,943	104,789	15,790	133,492	17,074	163,802
Ontario.....	18,954	180,153	21,737	206,979	9,722	104,667
Total.....	31,897	284,942	37,527	340,471	26,796	268,469
IMPORTS.....	3,171	53,818	3,955	65,997	3,177	53,341
EXPORTS.....	28,101	230,945	29,896	242,915	21,183	165,482

Table 246.—Capital Employed in the Feldspar Industry in Canada, 1929 and 1930

	1929	1930
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$
Cost of lands, buildings, machinery and tools.....	116,005	89,000
Cost of supplies and stocks on hand.....	34,696	4,129
Cash, trading and operating accounts and bills receivable.....	72,742	13,232
Total.....	223,443	106,361

Table 247.—Employees, Salaries and Wages in the Feldspar Industry in Canada, 1929 and 1930

	1929				1930			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	5	4	9	19,936	12	2	14	23,550
Wage-earners.....	200		200	144,504	237		237	90,233
Total.....	205	4	209	164,440	249	2	251	113,783

Table 248.—Wage-Earners in the Feldspar Industry in Canada, by Months, 1929 and 1930

Month	Number		Month	Number	
	1929	1930		1929	1930
January.....	150	159	July.....	182	138
February.....	132	120	August.....	215	141
March.....	127	105	September.....	208	148
April.....	119	71	October.....	175	129
May.....	201	151	November.....	167	116
June.....	210	154	December.....	148	59

Table 249.—World Production of Feldspar, 1928-1930

(Supplied by Imperial Institute)
(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom (China stone).....	61,579	64,558	62,920
Canada.....	28,479	33,506	23,925
Australia.....	161	78	69
Union of South Africa.....	29		
Total.....	90,248	98,142	86,914
FOREIGN COUNTRIES			
Czechoslovakia (estimated).....	30,000	30,000	30,000
Finland.....	700	(a)	(a)
France.....	31,500	(a)	(a)
Germany (Bavaria).....	6,132	7,575	5,069
Italy.....	4,882	6,700	5,659
Norway (Exports).....	23,894	26,104	19,608
Roumania.....	2,790	2,440	1,932
Russia (fiscal years Sept. 30th).....	19,987	(a)	(a)
Sweden.....	39,290	38,475	32,739
United States (sales).....	210,811	197,699	171,788
Argentina.....	403	420	193
Manchuria.....		344	(a)
Total.....	370,389	309,757	266,988
Grand total	460,637	407,899	353,902

(a) Data not available.

GYPSUM

The production of gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is one of Canada's oldest industries. Up to the beginning of this century, Nova Scotia, New Brunswick and Ontario constituted the producing provinces. Manitoba commenced production in 1901, and ten years later, gypsum mining was started in British Columbia.

Production of gypsum from Canadian deposits during 1930 amounted to 1,070,968 tons valued at \$2,818,788 as against 1,211,689 tons worth \$3,345,696 in 1929. Gypsum quarried during the year totalled 1,100,048 tons of which 168,967 tons or 15.3 per cent was calcined in Canada.

Gypsum in various forms occurs in 13 counties of Nova Scotia, the great majority of these deposits are close to either rail or ocean transportation; in 1930 the mineral was produced in Canada from quarries in Hants, Inverness and Victoria counties, New Brunswick; near Paris, in central Ontario; Gypsumville, Manitoba; and in the Kamloops and Clinton mining divisions of British Columbia.

Approximately 78 per cent of the Nova Scotia production was shipped as crude gypsum to the United States during 1930; anhydrite shipments were made to Virginia where the mineral is used as a fertilizer and moisture retainer in the peanut growing districts. At Iona, gypsum is calcined, and marketed throughout Eastern Canada as finished, hard, neat and dental plasters; shipments have also been made to New Zealand. Hard wall and selenite plasters are manufactured in Windsor, N.S., from gypsum quarried at local quarries and from deposits operated at Clarksville.

In New Brunswick hard wall and finishing plasters, together with allied products, are produced from a very high quality gypsum mined at Hillsborough. Small shipments of land plaster were made from a quarry at Plaster Rock, N.B.

Ontario's output of crude and calcined gypsum was produced by the Gypsum, Lime and Alabastine Company, Ltd.; this company, in 1930, operated quarries at Oneida (Lythmore) and Seneca (Caledonia).

In Manitoba crude gypsum quarried from deposits near Gypsumville was shipped to Winnipeg for processing.

Production from the Falkland quarry in British Columbia was shipped to Port Mann gypsum products plant; other shipments from this deposit were made to Alberta and to New Zealand and Asiatic ports. Gypsite was produced in the Clinton mining division.

Exports of crude gypsum during 1930 amounted to 719,381 tons valued at \$871,567; this tonnage went entirely to the United States. Plaster of Paris, ground and prepared wall plaster exported during the year totalled 7,282 tons and consisted of shipments chiefly to New Zealand and the United States.

Table 250.—Annual Production of Gypsum in Canada, by Provinces, 1921-1930

(For the years 1874 to 1920 see Mineral Production of Canada, 1928)

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1921..	206,831	\$ 511,883	54,030	\$ 360,220	84,790	\$ 433,053	40,859	\$ 480,282	40	\$ 100	386,550	\$ 1,785,533
1922..	332,404	580,148	82,462	517,668	110,227	621,668	34,072	440,914	100	500	559,265	2,160,898
1923..	341,705	747,934	104,740	564,680	99,958	542,317	31,575	386,554	323	1,615	578,301	2,243,100
1924..	441,752	915,845	86,738	476,804	88,121	467,097	29,375	348,212	30	150	646,016	2,298,108
1925..	551,230	1,070,408	71,745	408,917	82,020	491,833	35,088	417,868	240	865	740,323	2,389,891
1926..	678,107	1,187,918	59,546	468,411	89,987	496,059	35,172	461,461	20,916	156,964	883,728	2,770,813
1927..	829,438	1,512,015	85,293	524,550	83,998	500,688	39,895	512,008	24,493	201,754	1,063,117	3,251,015
1928..	1,013,257	1,850,243	75,033	501,252	85,811	553,271	51,285	609,039	20,982	229,843	1,246,368	3,743,648
1929..	948,895	1,152,160	70,482	485,982	100,347	832,689	67,269	631,051	24,696	243,814	1,211,689	3,345,696
1930..	827,063	982,287	82,674	513,677	94,946	776,069	34,157	298,297	32,128	248,458	1,070,968	2,818,788

Table 251—Summary of Statistics on Gypsum in Canada, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
Crude gypsum mined.....	1,311,642	\$	1,225,728	\$	1,100,048	\$
Crude gypsum calcined.....	226,997		218,008		168,967	
PRODUCTION BY GRADES—						
Crude—						
Lump.....	43,224	80,467	44,848	90,071	56,628	116,401
Crushed.....	1,018,172	1,770,077	964,875	1,147,289	845,210	973,623
Fine ground.....	9,576	55,170	2,201	17,271	8,160	38,894
Calcined.....	175,396	1,837,934	199,765	2,091,065	160,970	(a) 1,698,870
Total.....	1,246,368	3,743,648	1,211,689	3,345,696	1,070,968	2,818,788
PRODUCTION BY PROVINCES—						
Nova Scotia.....	1,013,257	1,850,243	948,895	1,152,160	827,063	982,287
New Brunswick.....	75,033	501,252	70,482	485,982	82,674	513,677
Ontario.....	85,811	553,271	100,347	832,689	94,946	776,069
Manitoba.....	51,285	609,039	67,269	631,051	34,157	298,297
British Columbia.....	20,982	229,843	24,696	243,814	32,128	248,458
Total.....	1,246,368	3,743,648	1,211,689	3,345,696	1,070,968	2,818,788
IMPORTS—						
Gypsum, crude (sulphate of lime)*.....	1,097	40,312	1,244	18,671	898	25,882
Plaster of Paris, or gypsum ground not calcined.....	256	7,379	165	5,283	219	5,352
Plaster of Paris, or gypsum calcined and prepared wall plaster.....	10,563	142,550	16,356	189,438	16,608	190,832
Total.....	11,916	190,241	17,765	213,392	17,725	222,066
EXPORTS—						
Gypsum or plaster crude.....	824,536	1,240,987	893,445	1,086,939	719,381	871,567
Plaster of Paris, ground and prepared wall plaster.....	8,232	140,946	7,938	137,046	7,282	119,092
Total.....	832,768	1,381,933	901,383	1,223,985	726,663	990,659

* Consists of crown filler and anhydrous sulphate of lime.

† Shipments of crude gypsum include some anhydrite produced in Nova Scotia.

(a) Does not include gypsum calcined in manufacturers' plants in Calgary and Montreal.

Table 252.—Capital Employed in the Gypsum Industry in Canada by Provinces, 1929 and 1930

	1929			1930		
	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, machinery and tools.....	3,822,349	2,415,357	6,237,706	3,451,596	3,908,559	7,360,155
Cost of all supplies and stocks on hand....	396,096	279,878	675,974	369,679	291,939	661,618
Cash, trading and operating accounts and bills receivable.....	307,027	217,898	524,925	370,598	404,494	775,092
Total.	4,525,472	2,913,133	7,438,605	4,191,873	4,604,992	8,796,865

Table 253.—Employees, Salaries and Wages in the Gypsum Industry in Canada, 1929 and 1930

	1929				1930			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	58	13	71	\$ 175,256	56	13	69	\$ 152,158
Wage-earners—								
Mine.....	622		622		457		457	
Mill.....	293	1	294		296		296	
Total.....	915	1	916	\$ 878,957	753		753	\$ 629,481
Grand total	973	14	987	1,054,213	809	13	822	781,639

Table 254.—Wage-Earners in the Gypsum Industry in Canada by Provinces and by months, 1930

Month	Nova Scotia		New Brunswick, Ontario, Manitoba and British Columbia		Canada	
	Mine	Mill	Mine	Mill	Mine	Mill
January.....	60	30	142	168	202	198
February.....	56	35	156	167	212	202
March.....	73	41	159	190	232	231
April.....	274	100	193	205	467	305
May.....	338	92	194	204	532	296
June.....	433	90	190	202	623	292
July.....	463	85	188	217	651	302
August.....	473	89	178	194	651	283
September.....	315	111	177	191	492	302
October.....	272	70	151	257	423	327
November.....	159	62	127	248	286	310
December.....	120	41	121	237	241	278

Table 255.—World Production of Gypsum 1928-1930

(Supplied by Imperial Institute)

(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	634,645	967,491	838,208
Canada.....	1,171,109	1,081,865	982,186
Union of South Africa.....	14,637	16,973	16,828
Cyprus (exports).....	11,426	12,556	10,287
Palestine.....	1,320	1,475	1,635
India.....	59,050	52,726	56,316
Australia.....	118,867	124,515	60,000
Total.....	2,010,000	2,260,000	1,970,000
FOREIGN COUNTRIES			
Austria (d).....	44,000	42,000	(a)
Estonia.....	7,856	9,835	1,932
France.....	2,167,900	(a)	(a)
Germany (Bavaria).....	53,622	59,241	41,114
Prussia (alabaster).....	445	396	287
Italy (including alabaster).....	640,587	658,678	674,703
Jugoslavia (Serbia only).....	1,152	1,585	1,440
Latvia (exports).....	27,577	26,629	36,077
Luxemburg.....	2,466	7,092	10,451
Roumania (b).....	47,030	75,414	50,442
Russia (years ended Sept. 30).....	404,868	(a)	(a)
Spain (b).....	1,037,368	960,250	(a)
Sweden.....	114	120	(a)
Algeria (including alabaster).....	79,200	101,394	164,100
United States.....	4,555,580	4,478,689	3,099,458
Tunis.....	16,000	19,231	(a)
Argentina.....	40,949	36,051	48,677
Chile.....	8,969	15,190	(a)
Peru.....	15,388	19,830	(a)
China.....	48,000	(c) 50,000	(c) 50,000
Japan.....	67,433	(a)	(a)
Cuba.....	23,572	25,000	.....
Egypt (estimated).....	130,000	130,000	130,000
New Caledonia.....	15,000	(a)	(a)
Total.....	9,400,000	(a)	(a)
Grand total.....	11,400,000	(a)	(a)

(a) Data not available.

(b) Converted from cubic metres at the rate of 1 cubic metre = 2 long tons.

(c) Estimated.

(d) Estimated by Bundesministerium für Handel und Verkehr.

IRON OXIDES (OCHRE)

In 1851, an important deposit of ochre was worked at Pointe du Lac, St. Maurice county, Quebec, and shipments of dried ochre were made to the United States, subsequently this property was abandoned. Thirty-two years later the manufacture of dry ochre was commenced on a small scale in Iberville township on the Little Romaine river. This deposit was later abandoned but in 1916 it was re-opened and a small quantity of crude ochre was taken out for use as a pigment in the paper industry. A deposit was opened up at St. Malo, Champlain county, in 1885 and a calcining plant erected. Calcined ochre was shipped from this mill to Montreal where it was further prepared for use in the manufacture of paint.

Deposits of iron oxides in the Three Rivers district, Quebec, are important. The Canada Paint Company Limited, operates a large plant at Red Mill for calcining, washing and grinding pigments.

About one and a half miles east of Red Mill, the Champlain Oxide Company operated a calcining plant. No shipments have been made from this plant since 1923.

For a number of years Thos. H. Argall operated a calcining plant near the Champlain mill. Operations ceased due to labour troubles and this producer opened up another deposit at Pointe du Lac from which crude iron oxides are shipped for use in the purifying of illuminating gas.

The Montmorency Paints Products Company have abandoned their deposit at Beaupré, and have removed their plant to a new deposit at Les Forges, some seven miles north of Three Rivers. Operations are now being conducted at this new location.

Prior to 1911 small quantities of ochre were produced intermittently from a deposit at Campbellville, Halton county, Ontario. No production has been recorded in this province since that date.

In 1930 a small shipment of ochre was made to Calgary, Alberta, from a property in Windermere district, British Columbia.

Shipments of iron oxides from Canadian deposits during 1930 totalled 6,596 tons valued at \$83,873 as compared with 6,518 tons worth \$115,932 in 1929.

Yellow ochres and raw siennas used as pigments are largely obtained from natural deposits of hydrated ferric oxide (limonite), Spanish red oxide is the mineral hematite.

Table 256.—Production of Iron Oxides in Canada, 1921-1930

(For the Years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	9,048	93,610	1926.....	6,626	101,843
1922.....	7,285	110,608	1927.....	6,125	103,536
1923.....	10,424	129,636	1928.....	5,414	111,198
1924.....	7,266	91,160	1929.....	6,518	115,932
1925.....	7,118	91,913	1930.....	6,596	83,873

Table 257.—Production in Canada, Imports and Exports of Iron Oxides, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	5,414	111,198	6,518	115,932	6,596	83,873
IMPORTS—						
Ochres, ochrey earths, siennas, and umbers.....	3,279	111,751	3,495	121,698	2,413	75,596
Oxides, fire proofs, rough stuffs, fillers and colours, dry, n.o.p.....	3,485	709,529	3,683	790,654	3,392	697,331
EXPORTS—						
Mineral pigments, iron oxides and ochres..	1,124	44,342	1,113	42,554	417	32,798

Table 258.—Capital Employed in the Iron Oxides Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	133,736	106,809
Cost of supplies and stocks on hand.....	24,645	38,590
Cash, trading and operating accounts and bills receivable.....	1,142	5,305
Total.....	159,523	150,704

Table 259.—Employees, Salaries and Wages in the Iron Oxides Industry in Canada, 1929 and 1930

Class	1929		1930	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried employees.....	2	3,560	2	4,543
Wage-earners.....	46	43,764	41	36,695
Grand total.....	48	47,324	43	41,238

Table 260.—Wage-Earners in the Iron Oxides Industry in Canada, by Months, 1929 and 1930

Month	Number		Month	Number	
	1929	1930		1929	1930
January.....	23	29	July.....	49	51
February.....	23	29	August.....	53	53
March.....	29	21	September.....	53	53
April.....	29	21	October.....	52	43
May.....	45	24	November.....	39	45
June.....	44	25	December.....	28	52

MICA

Important deposits of mica in Canada are located in the counties of Hull and Labelle in Quebec, and Lanark, Leeds and Frontenac in Ontario. The product of these mines is chiefly shipped to Canadian mica trimming shops where it is either rough-cobbed or split and trimmed prior to export.

Mica production in Canada during 1930 amounted to 1,170 tons valued at \$96,004 as compared with 4,053 tons worth \$118,549 in 1929. This output came entirely from deposits in Quebec and Ontario.

Imports of mica and manufactures of, into Canada, were valued at \$102,775, a decrease of 39.2 per cent from the 1929 total. Receipts from the United Kingdom amounted in value to \$5,816; United States, \$59,313; and British India, \$37,108.

Exports of mica during 1930 consisted of 39 tons of splittings, 2 tons of rough-cobbed and thumb-trimmed, and 1,039 tons of a scrap and waste. The total value of Canadian mica exported in 1930 was \$86,537. This included shipments worth \$3,890 to the United Kingdom and \$81,913 to the United States.

In Quebec, the Blackburn mine was the most active producer during the year and in the fall of 1930 a mica grinding plant was installed near the mine, the product of this plant goes to the roofing and rubber trades.

British Columbia mica deposits occurring in pegmatite on Compania Island, near Hecate Strait, were investigated in 1930, the mica is light coloured and resembles muscovite. No work has been done on these deposits.

Table 261.—Production of Mica in Canada, by Provinces, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1921.....	484	41,172	218	28,891	702	70,063
1922.....	1,360	97,748	1,989	54,515	3,349	152,263
1923.....	1,545	216,684	1,980	110,290	3,525	326,974
1924.....	1,677	185,020	2,414	172,252	4,091	357,272
1925.....	2,415	178,800	1,605	82,663	4,020	261,463
1926.....	1,664	170,118	881	59,086	2,545	229,294
1927.....	1,454	99,194	1,284	75,183	2,738	174,377
1928.....	1,101	54,224	2,559	32,944	3,660	87,168
1929.....	1,062	72,630	2,991	45,919	4,053	118,549
1930.....	430	61,729	740	34,275	1,170	96,004

Table 262.—Production of Mica in Canada by Grades, 1929 and 1930

	1929			1930		
	Pounds	Value f. o. b. shipping point	Price per pound	Pounds	Value f. o. b. shipping point	Price per pound
		\$	\$		\$	\$
Rough cobbled.....				44,330	1,142	0-02
Thumb-trimmed.....	97,331	17,131	0-18	8,096	8,281	1-02
Splittings only.....	22,750	13,732	0-60	77,530	35,601	0-46
Scrap.....	7,986,878	87,686	0-01	2,211,022	50,980	0-02
Total.....	8,106,959	118,549	0-015	2,340,978	96,004	0-04

Table 263.—Production in Canada, Imports and Exports of Mica, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	1,101	54,224	1,062	72,630	430	61,729
Ontario.....	2,559	32,944	2,991	45,919	740	34,275
Total.....	3,660	87,168	4,053	118,549	1,170	96,004
IMPORTS—						
Mica and manufactures of, n.o.p.....		135,301		169,018		102,775
EXPORTS—						
Rough cobbled and thumb-trimmed.....	32	15,951	2	1,342	2	1,461
Splittings.....	84	80,902	91	96,726	39	35,351
Scrap and waste.....	4,346	78,262	4,789	112,905	1,039	48,436
Plate and manufactures (micanite).....		646		2,086		1,289
Total.....		175,761		213,059		86,537

Table 264.—Capital Employed in the Mica Mining Industry in Canada, by Provinces, 1929 and 1930

	1929			1930		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—						
Cost of lands, buildings, machinery and tools.....	157,887	29,037	186,924	165,866	66,723	232,589
Cost of supplies and stocks on hand.....	46,803	5,147	51,950	35,672	124,502	160,174
Cash, trading and operating accounts and bills receivable.....	39,921	2,500	42,421	43,481	5,500	48,981
Total.....	244,611	36,684	281,295	245,019	196,725	441,744

Table 265.—Wage-Earners in the Mica Mining Industry in Canada, by Months, 1929 and 1930

Month	Number		Month	Number	
	1929	1930		1929	1930
January.....	37	171	July.....	83	280
February.....	41	196	August.....	87	249
March.....	42	228	September.....	100	258
April.....	38	204	October.....	71	269
May.....	73	233	November.....	39	267
June.....	89	245	December.....	18	137

Table 266.—Employees, Salaries and Wages in the Mica Mining Industry in Canada, 1929 and 1930

	1929		1930	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried employees.....	5	11, 116	4	6, 938
Wage-earners.....	78	36, 246	240	56, 378
Total.....	83	47, 362	244	63, 316

Table 267.—World Production of Mica, 1928-1930

(Supplied by *Imperial Institute*)

(Long tons)

Country and Description	1928	1929	1930
BRITISH EMPIRE			
Kenya.....	(1,190 lb.)	2	.....
Northern Rhodesia.....	4	3	4
Southern Rhodesia.....	183	169	162
South West Africa (waste).....	.....	31	.....
Tanganyika Territory.....	33	29	21
Union of South Africa (b).....	3, 572	1, 525	878
Canada—			
Rough cobbled.....	.....	.....	20
Thumb trimmed.....	41	43	4
Splittings.....	11	10	34
Scrap.....	3, 216	3, 566	987
Ceylon (exports).....	.....	(12 cwt.)	.....
British India (exports)—			
Sheet.....	621	890	741
Splittings.....	4, 153	4, 914	3, 404
Australia.....	12	27	26
FOREIGN COUNTRIES			
Norway (exports)—			
Sheet.....	2	.....	1
Scrap.....	82	(a) 58	51
Russia (years ended Sept. 30).....	1, 469	(a)	(a)
Sweden.....	12	65	72
Madagascar—			
Muscovite.....	41	(c) 28	(c) 18
Phlogopite, etc.....	800	(c) 372	(c) 372
United States (sales)—			
Sheets (uncut).....	751	909	654
Scrap.....	6, 929	5, 583	6, 011
Argentina.....	118	117	98
Brazil.....	74	44	51
Korea.....	28	22	28
Guatemala.....	13	2	(a)

(a) Information not available.

(b) Nearly all scrap.

(c) Exports.

The following amounts of lithium mica were produced:—

	1928	1929	1930
South West Africa.....	.....	.....	250 long tons
France.....	1, 000	(a)	(a) "
Germany.....	265	777	(a) "
Portugal.....	336	740	269 "

QUARTZ

Quartz production in Canada prior to 1906 was not sufficiently remunerative to create expansion in the industry. The earliest record available shows that in 1890 a shipment of 200 tons valued at \$1,000 was made from a Quebec deposit. Small shipments were recorded in 1893, 1896, 1898 and 1899. During 1906 production commenced for the purpose of supplying flux and furnace linings to the industries in the Sudbury district of Ontario. Shipments from Ontario quarries have been continuous since that date.

In 1930, quartz for use as a flux was produced in Ontario and British Columbia. Silica sand for the manufacture of silica brick was made from silica rock quarried in Nova Scotia and Ontario. Considerable quantities of silica sand (ground quartz) and crude quartz were shipped from Quebec deposits for use in the manufacture of glass, chemicals, etc.

The output of quartz in Canada during 1930 amounted to 226,200 tons valued at \$418,127 as compared with 265,949 tons at \$561,527 in 1929.

Imports into Canada of silex or crystallized quartz totalled 5,040 tons valued at \$111,473 in 1930; the 1929 imports were recorded at 3,995 tons valued at \$79,653. Flint importations in 1930 reached a total of 3,878 tons valued at \$37,811 as against 3,595 tons appraised at \$39,272 in 1929.

During the year the Ottawa Silica Supply Company acquired the mill at East Templeton Quebec, formerly operated by Canada Glass Products Limited. The new grinding plant of the Canadian Flint and Spar Company, Buckingham, Quebec, will produce finely crushed silica for the ceramic and paint trades. The quartz obtained as a by-product in feldspar mining operations in Quebec often finds a market at the chemical plant of the Electric Reduction works in Buckingham.

Table 268.—Production of Quartz in Canada, 1921-1930

(For the years 1890 to 1920 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	100,350	312,947	1926.....	232,032	553,161
1922.....	109,947	208,598	1927.....	233,984	496,364
1923.....	264,076	599,250	1928.....	282,522	523,933
1924.....	150,896	323,156	1929.....	265,949	561,527
1925.....	197,224	363,612	1930.....	226,200	418,127

Table 269.—Production in Canada, and Imports of Quartz, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Nova Scotia.....	7,424	28,022	11,845	31,388	8,057	18,494
Quebec.....	64,577	143,067	46,444	132,532	49,561	119,668
Ontario.....	194,503	308,608	187,973	316,050	167,487	274,674
Manitoba.....	*1	360	10,045	35,610		
British Columbia.....	16,017	43,876	9,642	45,947	1,095	5,291
Total.....	282,522	523,933	265,949	561,527	226,200	418,127
IMPORTS—						
Silex or crystallized quartz, ground or un-ground.....	2,865	73,755	3,995	79,653	5,040	111,473
Flint and ground glint stones.....	3,545	36,204	3,595	39,272	3,878	37,811

*Rose Quartz.

Table 270.—Capital Employed in the Quartz Mining Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	900,387	656,966
Cost of supplies and stocks on hand.....	79,581	90,547
Cash, trading and operating accounts and bills receivable.....	20,264	16,614
Total.....	1,000,232	764,127

Table 271.—Employees, Salaries and Wages in the Quartz Mining Industry in Canada, 1929 and 1930

	1929				1930			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	17	1	18	22,311	12		12	21,951
Wage-earners.....	261		261	167,140	166		166	121,654
Total.....	278	1	279	189,451	178		178	143,605

Table 272.—Wage-Earners in the Quartz Mining Industry in Canada, by Months, 1929 and 1930

Month	1929	1930	Month	1929	1930
January.....	95	40	July.....	208	153
February.....	101	36	August.....	212	129
March.....	95	77	September.....	180	138
April.....	121	73	October.....	161	111
May.....	212	110	November.....	129	103
June.....	225	169	December.....	81	49

SALT

The production of salt in the province of Ontario was first recorded in 1866 when a company was formed to drill for oil on the north bank of the Maitland river, and, while no success attended the efforts of the drillers in their search for oil, a bed of rock salt was found at a depth of 964 feet. In September, 1866, this company (incorporated under the name of the *Goderich Petroleum Company*, later changed to *Goderich Salt Company*) commenced pumping brine. In the initial working in connection with these deposits the refining was done by the kettle method, which was soon discarded and replaced by the pan method of evaporation. Wells were drilled and plants erected at Clinton and Seaforth, Ontario, and four refineries were in operation at Goderich in 1879; at the present time there are only two firms operating at Goderich.

Census reports show that there were 16 salt works in operation in Ontario and 2 in Nova Scotia during 1871. The Ontario plants employed 175 men with a total wage of \$60,990 while the products made were valued at \$119,999. In Nova Scotia during that year there were 10 employees who received \$2,040 and the total value of the plant production was \$16,600. According to the 1881 census, 26 plants were in operation in Ontario and 1 each in Nova Scotia and New Brunswick. Total employees that year numbered 247 earning \$78,517; products made were valued at \$395,848 and the capital invested in the operating plants was \$298,100.

Salt production in Canada during 1930 amounted to 271,695 tons valued at \$1,694,631. This represents a decrease of 17·7 per cent in quantity from the high record production of 1929. The value, however, was considerably greater than that for the previous year. Shipments in 1930, exclusive of the salt content of brine used in the manufacture of chemicals, averaged \$10.05 per ton as against \$8.70 per ton in 1929. This increase was largely due to the advance in value of table, dairy, common fine, and common coarse salt.

Canadian exports of salt in 1930 amounted to 8,758 tons as compared with 9,359 tons in 1929. Imports of salt were 128,385 tons valued at \$660,903, or a decrease of 27·2 per cent in quantity and 29·4 per cent in value from the previous year.

In 1930 Canada's first synthetic ammonia plant was established at Sandwich, Ontario, by the Canadian Industries Limited. Hydrogen is obtained from electrolytic cells operating to produce chlorine and caustic soda from salt. Atmospheric nitrogen is then combined with hydrogen by catalytic action to form ammonia. At the Brunner Mond plant in Amherstburg saturated brine solutions pumped from wells are utilized in the making of soda ash by the Solvay process.

The salt production in Nova Scotia comes from the Malagash deposit in Cumberland county. It is estimated that this mine contains 60,000,000 tons of developed salt reserves sufficiently pure to sell directly after mining and crushing. It is reported that this deposit also contains 300,000,000 tons of a slightly lower grade. An interesting feature of this deposit is the presence of potassium salts which may ultimately prove of economic importance.

Table 273.—Production of Salt in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	164,658	1,673,685	1926.....	262,547	1,480,149
1922.....	181,794	1,628,323	1927.....	268,672	1,614,667
1923.....	202,397	1,713,516	1928.....	299,445	1,495,971
1924.....	207,979	1,374,780	1929.....	330,264	1,578,086
1925.....	233,746	1,410,697	1930.....	271,695	1,694,631

Table 274.—Production of Salt in Canada, by Grades, 1929 and 1930

Grade	1929			1930		
	Manu- factured	Sold	Value of salt sold (Not includ- ing con- tainers)	Manu- factured	Sold	Value of salt sold (Not includ- ing con- tainers)
	Tons	Tons	\$	Tons	Tons	\$
Table and dairy.....	54,618	54,138	785,559	49,050	49,467	868,396
Common fine.....	49,538	49,869	235,335	54,212	55,373	302,526
Common coarse.....	50,399	50,383	322,600	44,635	44,149	326,326
Land salt.....	1,407	1,919	7,209	281	281	1,414
Other grades.....	5,875	5,628	58,607	7,557	7,688	80,025
Brine for chemical works (Salt equivalent sold or used).....	168,327	168,327	168,776	114,737	114,737	115,944
Total.....	330,164	330,264	1,578,086	270,472	271,695	1,694,631
Value of containers.....			543,022			499,740
Grand total.....			2,121,108	270,472	271,695	2,194,371

Table 275.—Production in Canada, Imports, Exports and Consumption of Salt, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	299,445	1,495,971	330,264	1,578,086	271,695	1,694,631
IMPORTS—						
Salt, for the use of the sea or gulf fisheries	74,192	417,594	82,530	370,211	56,133	195,760
Salt, in bulk, n.o.p.....	68,765	254,218	54,997	208,130	40,910	169,948
Salt, n.o.p., in bags, barrels, etc.....	45,589	416,149	38,794	342,302	31,273	273,448
Salt, table, made by an admixture of other ingredients, when containing not less than 90 per cent of pure salt.	479	35,007	245	16,177	69	21,747
Total.....	189,025	1,122,968	176,566	936,829	128,385	660,903
EXPORTS.....	2,930	36,399	9,359	70,762	8,758	74,397
APPARENT CONSUMPTION OF SALT.....	485,540	2,582,540	497,471	2,444,144	391,322	2,281,137

Table 276.—Capital Employed in the Salt Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	3,865,994	3,975,855
Cost of supplies and stocks on hand.....	334,338	284,887
Cash, trading and operating accounts and bills receivable.....	376,211	424,807
Total.....	4,576,543	4,685,549

Table 277.—Employees, Salaries and Wages in the Salt Industry in Canada, 1929 and 1930

	1929				1930			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
Salaried employees.....	41	12	53	\$ 102,502	42	10	52	\$ 107,637
Wage-earners.....	329	42	371	413,951	290	39	329	347,902
Total.....	370	54	424	516,453	332	49	381	455,539

Table 278.—Wage-Earners in the Salt Industry in Canada, by Months, 1929 and 1930

Month	1929		1930		Month	1929		1930	
	Male	Female	Male	Female		Male	Female	Male	Female
January.....	263	39	245	33	July.....	339	43	310	39
February.....	313	39	197	32	August.....	335	47	292	39
March.....	340	41	241	40	September.....	335	45	308	38
April.....	365	39	299	40	October.....	350	46	296	37
May.....	361	40	308	40	November.....	303	44	265	36
June.....	344	42	302	39	December.....	290	43	253	36

Table 279.—World Production of Salt, 1928-1930

(Supplied by Imperial Institute)

(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	1,946,318	1,974,170	2,067,564
Mauritius (estimated)†.....	1,500	1,500	1,500
Nigeria (estimated).....	400	400	400
Somaliland (exports)†.....	1,678	3,100	1,074
South-West Africa Territory.....	144	334	(a)
Anglo-Egyptian Sudan.....	12,284	14,715	14,082
Tanganyika Territory.....	5,053	7,270	6,256
Uganda.....	2,034	2,244	1,751
Union of South Africa (years ended June 30).....	82,412	87,453	(a)
Canada (shipments).....	269,206	294,879	240,046
West Indies (exports)†—			
Bahamas.....	700	800	3,100
Grenada.....	36	69	(a)
Leeward Islands.....	1,561	1,289	1,517
Turks & Caicos Islands.....	50,043	61,153	41,541
Ceylon.....	43,576	25,080	(a)
Cyprus (estimated).....	3,000	3,000	3,000
India (including Aden).....	1,515,349	1,709,100	1,711,348
Weihaiwei (estimated).....	2,000	2,000	2,000
Palestine.....	1,628	7,618	7,379
Australia.....	130,785	84,457	66,766
Total.....	4,100,000	4,300,000	4,300,000

Table 279.—World Production of Salt, 1928-1930—Concluded

(Supplied by *Imperial Institute*)
(Long tons)

Country	1928	1929	1930
FOREIGN COUNTRIES			
Korea.....	132,391	136,000	(a)
Albania.....	5,200	(a)	(a)
Italian East Africa.....	100,000	100,000	100,000
Angola (estimated).....	10,000	10,000	10,000
Austria.....	151,389	175,663	155,132
Bulgaria.....	46,043	28,195	1,677
Czechoslovakia.....	151,678	163,733	174,886
France.....	2,081,866	1,806,435	1,675,150
Germany.....	2,863,384	2,994,461	2,910,163
Greece (d).....	100,000	100,000	100,000
Italy.....	889,121	896,070	836,336
Jugoslavia.....	51,305	43,900	53,773
Netherlands (c).....	40,815	44,205	49,020
Poland.....	560,337	560,494	525,000
Portugal.....	31	28	.....
Roumania.....	337,365	316,422	302,084
Russia (years ended Sept. 30).....	2,286,563	2,579,000	3,378,000
Spain.....	967,533	1,062,427	(a)
Switzerland.....	78,719	85,110	79,554
Algeria.....	10,802	15,063	57,520
Ecuador.....	328	68	(a)
Belgian Congo (estimated).....	80	80	80
Panama (estimated).....	50,000	50,000	50,000
Egypt (exports).....	165,222	146,669	152,406
Abyssinia (estimated).....	20,000	10,000	(a)
French Morocco.....	8,000	(a)	(a)
French Somaliland.....	28,272	38,356	(a)
French West Africa (Mauritania).....	4,000	4,000	4,000
Tripoli (estimated).....	20,000	20,000	20,000
Tunis.....	103,100	120,000	(a)
Netherlands West Indies (exports).....	9,624	4,603	(a)
Mexico (estimated).....	66,000	66,000	66,000
United States.....	7,209,563	7,628,179	7,191,465
Argentina.....	164,970	184,675	142,309
Chile.....	34,197	36,831	(a)
Colombia (estimated).....	29,000	29,000	29,000
Peru.....	32,222	30,000	(a)
Venezuela (estimated).....	30,000	30,000	30,000
China including Kwantung Peninsula.....	2,400,570	2,408,019	2,562,500
Netherlands East Indies.....	275,907	505,986	(a)
Formosa.....	116,513	161,761	(a)
French Indo-China.....	158,700	251,100	(a)
Japan (c).....	627,813	633,977	(a)
Portuguese India (estimated).....	12,000	12,000	12,000
Siam.....	117,447	174,273	178,144
Turkey (Anatolia) (estimated).....	100,000	100,000	100,000
Philippine Island.....	70,346	46,136	(a)
Canary Islands.....	2,000	2,000	2,000
Total.....	23,000,000	24,000,000	25,000,000
Grand total.....	27,000,000	28,000,000	29,000,000

(a) Data not available.

(c) Excluding production from salt beds, which, although on government beach lands, have no fixed areas. Figures refer to years ended March 31.

(d) Estimated on previous years figures.

† Sea salt.

TALC AND SOAPSTONE

Shipments of talc and soapstone ranging from 50 tons to 1,420 tons were made from Canadian deposits during the period 1886 to 1906. Prior to 1900 the production consisted mainly of impure talc and soapstone shipped from Quebec. It was not until 1900 that mining operations were commenced on the high grade talc deposits of the Madoc district. Ground talc was shipped from this district in 1906. Production advanced during the ensuing years until 1920 the high mark for the industry was reached, namely 21,671 tons valued at \$166,934, an average of \$7.70 per ton. In the following year the 4 companies operating employed 34 men and produced 10,124 tons with an average value of \$14.28 per ton. During 1930, the 6 firms operating in this industry employed 141 persons.

The Quebec production consisted of soapstone blocks and powder shipped from a quarry in Broughton township. Ontario operators near Madoc, Hastings county, shipped 11,664 tons

of talc during the year. A small shipment was made from a talc deposit in the Victoria mining division, B.C.

Crystalline talc now finds extensive use in the ceramic industry for the manufacture of various kinds of tile and as an admixture with cement it affords greater plasticity to the mix and produces a high strength and smooth surfaced concrete.

Table 280.—Production of Talc and Soapstone in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	10,124	144,565	1926.....	15,767	217,195
1922.....	13,195	188,458	1927.....	16,521	236,105
1923.....	10,366	150,507	1928.....	16,058	219,358
1924.....	11,332	154,480	1929.....	15,509	229,198
1925.....	14,474	205,835	1930.....	11,841	186,216

Table 281.—Production in Canada, Imports and Exports of Talc and Soapstone, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Soapstone.....		40,171		47,986		50,168
Talc.....	14,925	179,187	15,509	181,212	11,841	136,048
Total.....		219,358		229,198		186,216
IMPORTS—						
Talc or soapstone, ground or unground. . .	5,421	91,702	5,516	109,675	4,799	85,779
EXPORTS—						
Talc, crude.....	10,946	133,601	11,399	139,096	8,512	98,855
Talc, refined.....						

Table 282.—Capital Employed in the Talc and Soapstone Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	575,502	567,135
Cost of all supplies and stocks on hand.....	26,592	16,536
Cash, trading and operating accounts and bills receivable.....	52,541	30,713
Total.....	654,635	614,384

Table 283.—Employees, Salaries and Wages in the Talc and Soapstone Industry in Canada, 1929 and 1930

	1929				1930			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
				\$				\$
Salaried employees.....	7	2	9	13,705	3	2	5	10,610
Wage-earners.....	77		77	60,595	136		136	68,862
Total.....	84	2	86	74,300	139	2	141	79,472

Table 284.—Wage-Earners in the Talc and Soapstone Industry in Canada, by Months, 1929 and 1930

Month	1929	1930	Month	1929	1930
January.....	80	137	July.....	76	39
February.....	77	37	August.....	70	134
March.....	75	135	September.....	75	38
April.....	74	37	October.....	75	36
May.....	77	140	November.....	76	129
June.....	78	43	December.....	68	28

Table 285.—World Production of Talc and Soapstone, 1928-1930

(Supplied by *Imperial Institute*)

(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	161	29	185
Union of South Africa.....	518	435	349
Canada shipments (b).....	13,326	13,847	10,572
India.....	5,539	7,217	6,857
Australia.....	1,327	1,333	681
Newfoundland (exports) (e).....	200		
Total.....	20,871	22,861	18,644
FOREIGN COUNTRIES			
Austria (exports).....	24,000	25,000	25,000
Finland.....	4,650	(a)	(a)
France.....	88,100	(a)	(a)
Germany (Bavaria).....	7,748	6,698	5,702
Greece.....	30	148	(a)
Italy.....	32,469	40,126	37,491
Norway (exports).....	7,698	8,200	7,569
Roumania (c).....	2,130	1,060	3,300
Russia (years ended Sept. 30).....	5,480	(a)	(a)
Spain.....	3,278	8,869	(a)
Sweden.....	4,799	6,915	(a)
Morocco (French zone) (exports).....	527	600	(a)
United States (d).....	181,229	196,235	160,165
Uruguay (exports).....	1,727	928	(a)
Manchuria.....	(a)	40,000	(a)
Total.....	273,000	335,000	239,000
Grand total.....	294,000	358,000	258,000

(a) Data not available.

(b) Excluding soapstone, which is only recorded by value and was as follows:—1928, £8,225; 1929, £9,807; 1930, £10,232.

(c) Converted from cubic metres at rate of 1 cu. metre = 2 long tons.

(d) Excluding steatite, figures for which are not available for publication.

(e) Years ended June 30 of the year stated.

MISCELLANEOUS NON-METAL MINING INDUSTRIES

Included in this chapter are the following non-metallic minerals:

Actinolite	Manganese, bog
Barytes	Mineral waters
Bituminous sands	Natro-alunite
Fluorspar	Phosphate
Graphite	Pyrites
Lithium minerals	Silica brick
Magnesite	Sodium carbonate
Magnesium sulphate	Sodium sulphate

Statistics relating to capital and labour are combined for these industries and are shown in Tables 286 to 288.

In addition to the foregoing, data are also shown for production, imports and exports of sulphuric acid and sulphur.

Table 286.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	3,516,650	3,180,465
Cost of supplies and stocks on hand.....	333,464	349,109
Cash, trading and operating accounts and bills receivable.....	192,524	79,322
Total.....	4,042,638	3,608,896

Table 287.—Employees, Salaries and Wages in the Miscellaneous Non-Metal Mining Industries, 1929 and 1930

	1929				1930			
	Number of employees			Salaries and wages	Number of employees			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	46	4	50	80,716	48	9	57	84,598
Wage-earners.....	456		456	464,500	440	1	441	442,585
Total.....	502	4	506	545,216	488	10	498	527,183

Table 288.—Wage-Earners in the Miscellaneous Non-Metal Mining Industries, by Months, 1929 and 1930

Month	Number		Month	Number	
	1929	1930		1929	1930
January.....	199	239	July.....	452	470
February.....	194	250	August.....	456	421
March.....	189	245	September.....	465	397
April.....	290	332	October.....	470	401
May.....	400	379	November.....	336	358
June.....	406	387	December.....	281	275

ACTINOLITE

Actinolite, which is a calcium-magnesium-iron silicate, is used in the manufacture of coal-tar roofing compounds. Mining of this mineral in Canada commenced in 1883. Canadian deposits from which production has been derived are located in Elzevir and Kaladar townships, Hastings county, Ontario; Actinolite, Ontario is the centre of this industry. In 1902 and 1903 production was at its peak and 550 tons were shipped; however, during the following six years, no operations were carried on. Shipments recommenced in 1910 and have continued up to the present. Annual production of ground actinolite during the past 9 years has ranged between 30 tons and 100 tons. In 1930, shipments to the United States from Canadian deposits amounted to 34 tons valued at \$437.

Table 288a.—Production of Actinolite in Canada, 1921-1930

(For production from 1897 to 1920 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	78	975	1926.....	80	1,000
1922.....	50	575	1927.....	86	1,075
1923.....	53	583	1928.....	70	875
1924.....	90	1,225	1929.....	30	375
1925.....	40	500	1930.....	34	437

BARYTES

Deposits of barytes at Five Islands, Colchester county, and Brookfield, Hants county, Nova Scotia, were first operated between 1865 and 1870. These deposits have produced about 5,000 tons of barytes. The McKellar Island deposit in Thunder Bay district, Ontario, in the course of its operations produced several thousand tons of this mineral. Work ceased on this property in 1894.

Large deposits of barytes at Lake Ainslie, Cape Breton Island, were opened up in 1894 and operations in this district have been practically continuous since that date. Between 1900 and 1903 the Cap Rouge deposit in North Cheticamp district was operated.

During 1918 a deposit in Langmuir township, Ontario, was active and a mill for grinding and preparing barytes was completed shortly before the close of navigation. A shipment of 60 tons was made. Development work was done on the Bellew mine in North Burgess township in 1918. A deposit near Tionaga station was operated in 1923 and 200 tons of barytes were shipped.

There is a growing demand for barium products particularly in the pigment industries. Production of metallic barium began commercially in the United States during 1929; it is being used in a high-nickel alloy.

The 1930 Canadian barytes production was obtained from the Johnson mine at Lake Ainslie, Inverness county, Nova Scotia.

Table 289.—Production of Barytes in Canada, 1921-1930

(For the years 1885 to 1920 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	270	9,567	1926.....	100	2,307
1922.....	289	9,537	1927.....	56	1,268
1923.....	409	8,548	1928.....	127	2,847
1924.....	151	3,308	1929.....	105	2,341
1925.....	95	2,259	1930.....	66	1,484

Table 290.—Production in Canada and Imports of Barytes, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	127	2,847	105	2,341	66	1,484
IMPORTS—						
Barium, peroxide of, non-alcoholic.....	7	1,304	14	2,216	3	1,141
Blanc fixe.....	622	35,470	946	52,473	1,055	52,591
Barytes.....	2,878	58,710	2,646	52,078	1,949	35,945
Lithopone.....	8,144	717,207	9,704	852,079	8,025	722,341
Satin white.....	1,413	46,703	1,252	38,315	829	19,579

BITUMINOUS SANDS

Bituminous sands are found in the Fort McMurray district, Alberta. This deposit is the largest occurrence of solid asphaltic material known. Considerable research work has been done in connection with these sands by the *Scientific and Industrial Research Council of Alberta* and the *Dominion Department of Mines*. Shipments of bituminous sands up to 1924 amounted to 531 tons. In 1925, the production was 1,148 tons at \$4,594; in 1926, shipments totalled 528 tons at \$2,112; and in 1927, the total was 2,706 tons valued at \$10,824. During these three years, the McMurray Asphaltum and Oil Company and the Federal Department of Mines were the only producers. Shipments amounting to 2,067 tons valued at \$8,268 were made in 1930.

Table 291.—Production of Bituminous Sands in Canada and Imports of Asphalt, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Bituminous sands.....	94	374	989	3,956	2,067	8,268
IMPORTS—						
Asphalt, solid.....	47,991	822,425	53,760	829,328	42,791	650,837
Asphalt, not solid.....		46,890		99,704		98,458
Asphaltum oil for paving purposes.....		95,562		23,448		70,130
Total.....		964,877		952,480		819,425

FLUORSPAR

The first recorded shipment of fluorspar from a Canadian deposit was made in 1905 when 12 tons were shipped from a mine in Madoc township, Ontario. Five years later about 200 tons were mined in Huntingdon township of which quantity 2 tons were shipped. In 1911, the metallurgical works at Deloro and the steel foundries at Welland received small shipments. During 1916, Ontario companies shipped 1,284 tons of fluorspar and increasing tonnages were produced during 1917 and 1918. In the latter year British Columbia became a producer of this mineral when the Rock Candy mine of the Consolidated Mining and Smelting Company near Grand Forks commenced operations.

Production of fluorspar in 1929 totalled 17,870 tons worth \$268,120. This output and value are the highest on record in the Canadian industry. In 1930 only 80 tons were mined, this was valued at \$1,240 and came entirely from deposits in Hastings county, Ontario.

Table 292.—Production of Fluorspar in Canada, by Provinces, 1921-1930

(For the years 1905 to 1920 see Mineral Production of Canada 1928)

	Ontario		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1921.....	116	1,744	5,403	134,523	5,519	136,267
1922.....	284	3,905	4,219	98,233	4,503	102,138
1923.....	64	597	75	1,135	139	1,732
1924.....	76	1,343			76	1,343
1925.....	12	200	3,674	19,034	3,886	19,234
1926-1928.....						
1929.....	70	1,120	17,800	267,000	17,870	268,120
1930.....	80	1,240			80	1,240

Table 293.—Production in Canada and Imports of Fluorspar, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....			17,870	268,120	80	1,240
IMPORTS—						
Hydrofluosilicic acid.....	6	1,646	36	4,706	5	1,353
Fluorspar.....	14,362	153,046	12,092	159,798	12,651	160,995

GRAPHITE

The first operations in the graphite industry in Canada were carried on in the province of Quebec in 1846, when a deposit of crystalline graphite was worked in Grenville township. During 1869 an estimated value of \$72,000 was placed on shipments of graphite from New Brunswick and Quebec. Ten years later exports from Canada were valued at \$1,167. During the three-year period 1869-1871, a property in Buckingham township, Quebec was operated with an

average production of 450 tons; employment was furnished 18 men during this period. From 1888 to 1899, operations were carried on intermittently in Buckingham township, however, from that date to 1906 little work was done on these deposits. In 1916, mills at Buckingham and St. Remi d'Amherst, shipped 479 tons.

Mining and milling of graphite in Ontario had its inception in 1870 when the Port Elmsley deposit was opened up and the Oliver's Ferry refining plant was constructed. A deposit in Bedford township was operated prior to 1890 and a small quantity of crystalline graphite was produced. In 1896 another producer commenced operations, namely, the Black Donald Company. This company's deposit is located near Calabogie in Renfrew county and is the largest and richest body of graphite known in North America. Operations have been practically continuous since the opening up of this property. The graphite is shipped as refined product, the higher grades which are used in lubricating compounds, being 90 to 99 per cent pure. These products are used principally in lubricants, foundry facings, stove polishes and in the manufacture of paints for iron and steel structural work. In 1919 the N. A. Timmins deposit in North Burgess township was opened up.

The demand for Canadian graphite during the war years reached its peak in 1916 when the production amounted to 3,955 tons valued at \$325,362.

In 1930 mines in the provinces of Ontario and Quebec supplied the total 1930 Canadian graphite output. Shipments during the year amounted to 1,535 tons valued at \$96,392 as against 1,461 tons worth \$103,174 in 1929. Exports of graphite, crude or refined, were reported at 2,418 tons with an appraised value of \$127,291.

A decreased activity, owing to trade depression, was general in the graphite mining industry throughout the world during 1930.

Table 294.—Production of Graphite in Canada, by Provinces, 1921-1930

(For production from 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1921.....	38	2,423	899	63,439	937	65,862
1922.....	24	1,500	573	29,853	597	31,353
1923.....	45	2,316	1,068	65,557	1,113	67,873
1924.....	46	3,275	1,288	72,842	1,334	76,117
1925.....	359	30,900	2,210	127,863	2,569	158,763
1926.....	326	29,516	2,401	165,344	2,727	194,860
1927.....	34	2,043	1,795	109,613	1,829	111,656
1928.....	50	4,668	1,047	52,373	1,097	57,041
1929.....	173	12,652	1,288	90,522	1,461	103,174
1930.....	197	9,850	1,338	86,542	1,535	96,392

Table 295.—Production in Canada, Imports and Exports of Graphite, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore milled.....	392	.....	5,448	.....	6,037	.....
Production.....	1,097	57,041	1,461	103,174	1,535	96,392
IMPORTS—						
Crucibles, plumbago.....		55,488		66,833		52,45
Plumbago, not ground or otherwise manufactured.....		4,023		6,546		2,032
Plumbago, ground and manufactures of, n.o.p.....		68,515		82,391		61,742
EXPORTS—						
Graphite or plumbago, crude or refined.	1,053	45,384	1,582	88,647	2,418	127,291

Table 296.—World Production of Graphite, 1928-1930

(Supplied by Imperial Institute)
(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
Canada (sales).....	979	1,304	1,370
Australia.....		50	(a)
Ceylon (exports).....	14,347	12,739	8,724
Tanganyika Territory.....	6		
Union of South Africa.....	50	52	206
India.....		39	
Total.....	15,400	14,200	10,300
FOREIGN COUNTRIES			
Austria.....	23,843	24,897	17,340
Brazil.....		15	(a)
Czechoslovakia.....	31,821	23,277	14,330
France.....	797	(a)	(a)
Germany.....	17,188	21,012	24,602
Italy.....	6,919	7,352	5,758
Russia (years ended Sept. 30).....	2,187	4,500	(a)
Japan.....	435	303	226
Korea.....	22,124	24,359	19,672
Madagascar.....	16,545	(b) 15,795	(b) 9,076
Morocco (French zone).....		44	(a)
Mexico.....	5,174	5,630	5,760
United States (sales).....	5,010	5,766	(a)
Total.....	132,000	134,000	108,000
Grand total.....	147,000	148,000	118,000

(a) Information not available.

(b) Exports.

ARTIFICIAL GRAPHITE

Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ontario. The annual production over a period of fifteen years is shown in the following table:

Table 297.—Artificial Graphite made in Canada, 1916-1930

Year	Pounds	Year	Pounds	Year	Pounds
1916.....	525,048	1921.....	376,508	1926.....	1,246,291
1917.....	1,096,172	1922.....	794,524	1927.....	1,187,011
1918.....	1,808,698	1923.....	1,554,376	1928.....	830,680
1919.....	358,524	1924.....	8,6455	1929.....	1,149,920
1920.....	207,180	1925.....	1,291,311	1930.....	763,825

LITHIUM MINERALS**CANADA**

In a statement prepared by J. F. Wright, *Federal Department of Mines*, Ottawa, Canada, on the subject of lithium minerals, there are the following remarks:—

An outcrop of massive lepidolite was discovered in July, 1924, about one mile south of the Winnipeg river, some 10 miles east and a little north of Pointe du Bois. The Manitoba lithium deposits are the only ones of possible commercial value known within the British Empire.

At the Silver Leaf Mining Syndicate deposit, the lithium minerals occur in pockets and lenses in the central portion of a body of pegmatite which is exposed for 125 feet in a general east-west direction and across an average width of 80 feet. An analysis of a hand-picked sample, judged to represent approximately the lithium-bearing rock after the gangue has been removed, gave 4.76 per cent lithia (Li_2O). There is estimated to be between 2,500 and 3,000 tons of this type of ore for each 10 feet in depth within a horizontal area equal to that at the surface. Two lens-shaped bodies of lepidolite, or a lithia mica of like character, estimated to contain about 540 tons of lithia ore for each 10 feet in depth and averaging 3.87 per cent lithia, occur near the south side of the pegmatite mass. This lithia mica contains only one-tenth of one per cent iron (Fe_2O_3), and therefore probably will be found satisfactory for the manufacture of opal, white and flint glass.

Active development commenced in 1925, camps being put up, and a compressor, drills, and gasoline engines installed. Three miles of pole tram-line and winter road were built to a point on the Winnipeg river a short distance below Lamprey Falls. A considerable tonnage of ore has been blasted out and some small shipments made to England, Germany and the United States. Transportation is not difficult as barges may be floated down the river to the railhead, Pointe du Bois.

Lithium minerals are used both in their natural state and as sources of salts and compounds. Lithium chloride, finds a large use in the manufacture of fireworks and signal lights. An exceptionally hard alloy has been developed in Germany composed of aluminium and a small percentage of lithium. An American alloy of extreme lightness contains lithium and beryllium.

MAGNESITE

Magnesite was discovered in Grenville township, Quebec, in 1900 but it was not until 1907 that these deposits were worked. In 1908 120 tons were shipped for use in the manufacture of carbonic acid gas and floor cement.

The cutting off of the Austrian supply of magnesite during the World War stimulated investigations of the Grenville deposits as a source of magnesite for the manufacture of refractory brick and furnace lining.

Operations in 1915 accounted for the employment of 110 men whose wages amounted to \$23,607 and a production of 14,779 tons. An output of 58,090 tons in 1917 represents a high record tonnage for the industry in Canada. Advances in prices occurred in 1918 and although the production of 39,365 tons in that year was 32.5 per cent less than the previous year the output value of \$1,016,765 constitutes a record in Canadian magnesite mining.

Hydromagnesite deposits near Atlin, British Columbia, were operated during 1915 and 1916; shipments recorded for the latter year amounted to 635 tons and were made to the eastern United States and to Great Britain. There has been no production from this source since 1921.

Canadian shipments of dead-burned and calcined magnesite made only from properties in Quebec during 1930 reached a total of 13,336 tons valued at \$336,162 as compared with 18,809 tons valued at \$491,170 in 1929.

Exports of magnesite including calcined and dead-burned in 1930 registered 1,851 tons with a value of \$48,536. Magnesite fire brick amounting in value to \$270,180 were imported principally from the United States during the same period.

The Mines Branch and National Research Council in Ottawa have co-operated in carrying out exhaustive and successful research on the utilization of Canadian magnesite in the manufacture of high temperature firebrick.

Table 298.—Production of Magnesite in Canada, 1921-1930

(For the years 1908 to 1920 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	3,730	81,320	1926.....	4,571	137,431
1922.....	2,849	76,294	1927.....	7,337	230,309
1923.....	4,801	134,382	1928.....	13,195	346,990
1924.....	3,873	101,356	1929.....	18,809	491,170
1925.....	5,576	122,325	1930.....	13,336	336,162

Table 299.—Production in Canada, Imports and Exports of Magnesite, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude, mined.....	36,719	.....	43,229	.....	27,638	.....
Crude, calcined or treated.....	31,488	.....	39,514	.....	28,128	.....
PRODUCTION—Calcined and dead-burned....	13,195	346,990	18,809	491,170	13,336	336,162
IMPORTS—						
Magnesia pipe covering.....		187,351		259,080		297,513
†Magnesite.....	220	9,543	125	4,423	89	3,629
Magnesite firebrick.....		140,944		256,635		270,180
EXPORTS—						
Magnesite, calcined or dead-burned.....	1,837	44,101	5,279	125,613	1,851	48,536

† January 1 to March 31, 1930 also in addition 260 tons of crude magnesite rock valued at \$5,187 were imported from April 1 to December 31, 1930.

Table 300.—World Production of Magnesite, 1928-1930

(Supplied by *Imperial Institute*)

(Long tons)

Country and description	1928	1929	1930
BRITISH EMPIRE			
Union of South Africa—			
Crude magnesite.....	1,457	1,682	1,879
Canada—			
Crude magnesite (mined).....	32,785	38,597	24,677
Caustic magnesite.....	11,781	16,794	11,907
India—			
Crude magnesite.....	24,406	23,497	16,523
Australia—			
Crude magnesite.....	10,786	9,115	8,700
FOREIGN COUNTRIES			
Austria—			
Crude magnesite.....	305,000	430,000	(a)
Caustic magnesite (c).....	37,000	(a)	(a)
Dead-burnt magnesite (c).....	69,000	88,400	(a)
Bricks (c).....	41,000	45,000	(a)
Czechoslovakia—			
Crude magnesite (b).....	8,278	10,027	7,003
Calcined magnesite (b).....	37,018	42,616	30,123
Greece—			
Crude magnesite.....	102,772	82,696	76,089
Caustic magnesite (c).....	25,787	32,087	(a)
Dead-burnt magnesite (c).....	128	1,229	(a)
Italy—			
Crude magnesite.....	11,505	16,901	4,057
Jugoslavia (Serbia only)—			
Crude magnesite.....	6,168	5,777	17,701
Calcined magnesite.....	(a)	(a)	6,585
Norway—			
Calcined magnesite.....	342	488	783
Magnesia bricks.....	337	524	326
Russia—(years ended Sept. 30)—			
Crude magnesite.....	118,090	130,614	(a)
Caustic magnesite (c).....	5,641	(a)	(a)
Dead-burnt magnesite (c).....	34,245	(a)	(a)
Magnesia bricks (c).....	17,426	(a)	(a)
United States—			
Crude magnesite.....	113,571	167,554	115,464
Caustic (sales) (c).....	11,884	10,170	7,661
Dead-burnt (sales) (c).....	40,384	70,268	44,161
Turkey—			
Crude magnesite.....		281	317
Manchuria—			
Crude magnesite.....	(a)	31,181	(a)

(a) Data not available.

(b) Exports less imports.

(c) Derived from crude shown and not additional.

MAGNESIUM SULPHATE

In 1915 work commenced on the Spotted Lake deposit of magnesium sulphate, near Kruger mountain, Osoyoos division, British Columbia. Shipments were made of this material to the drug trade during 1915 and 1916. Crude magnesium sulphate to a total of 2,600 tons was extracted in 1917 of which quantity 929 tons were shipped to Oroville, Washington. The following year a deposit near Clinton, Lillooet district, was also operated. Preliminary shipments were made in 1920 from several lakes, containing these salts, on the Basque ranch, near Ashcroft, British Columbia.

No activities have been reported in this industry since 1923. In that year 121 tons of refined magnesium sulphate were shipped from a deposit near Ashcroft, British Columbia. Imports of magnesium sulphate or epsom salts during 1930 reached a total of 2,566 tons valued at \$52,718; in the previous year 2,565 tons worth \$53,481 were brought into Canada.

Table 301.—Production of Natural Magnesium Sulphate in Canada, 1917-1930

Year	Tons	Value
		\$
1917.....	929	4,645
1918.....	1,949	14,565
1919.....	738	9,115
1920.....	1,947	39,886
1921.....	2,029	39,506
1922.....	1,021	24,017
1923.....	121	6,580
1924-1930.....		
Total.....	8,734	138,314

MANGANESE BOG

A deposit of bog manganese at Dawson Settlement, near Hillsborough, New Brunswick, was operated during 1930. The shipments from this property were consigned to the province of Quebec for use as a colouring agent in the brick trade.

MINERAL WATERS

A record of all the natural mineral waters produced in Canada and sold to the general public for medicinal purposes since 1888 has been compiled. In that year 124,850 gallons were produced and during the following ten years production varied between 424,600 gallons and 767,460 gallons. Only the value of shipments were recorded from 1899 to 1920; the high mark for the industry was reached in 1911 when the production was valued at \$223,758.

Production of natural mineral waters in Canada during 1930 amounted to 227,141 gallons valued at \$24,481, of this output Ontario contributed 214,200 gallons and Quebec, 12,941 gallons. Spring waters in the vicinity of the radium-bearing pegmatites in Cardiff township, Hastings county, Ontario, have been proven strongly radioactive and are considered of economic importance by the owners.

Table 302.—Production of Mineral Waters in Canada, 1921-1930

(For the years 1888 to 1920 see the Mineral Production of Canada, 1928)

Year	Imp. gal.	Value	Year	Imp. gal.	Value
		\$			\$
1921.....	328,273	21,716	1926.....	215,356	29,721
1922.....	221,433	14,220	1927.....	308,530	14,624
1923.....	232,451	16,455	1928.....	269,045	33,498
1924.....	209,353	15,421	1929.....	321,905	16,139
1925.....	190,134	28,413	1930.....	227,141	24,481

Table 303.—Production in Canada, Imports and Exports of Mineral Waters, 1928-1930

	1928		1929		1930	
	Imp. gal.	Value	Imp. gal.	Value	Imp. gal.	Value
		\$		\$		\$
PRODUCTION, by provinces—						
Quebec.....	15,415	5,608	12,205	2,488	12,941	3,727
Ontario.....	253,630	27,890	309,700	13,651	214,200	20,754
Total.....	269,045	33,498	321,905	16,139	227,141	24,481
IMPORTS—Mineral and aerated waters.....		209,714		253,940		195,257
EXPORTS—Mineral and aerated waters.....		31,621		12,320		10,017

PHOSPHATE

The existence of the extensive Lievre river deposits of crystalline phosphate lime or apatite was first noted in 1829. However, the first commercial shipments of this mineral in Canada were made between 1870 and 1877 from North Burgess township, Ontario to a superphosphate plant at Brockville. An active market was open in Europe for raw phosphate for fertilizer purposes and this added impetus to the mining of phosphate in Ontario and Quebec. From 1878 to 1892 inclusive, the industry in Canada was at its highest point, and 296,695 tons were produced. Exports during this 15-year period totalled 281,329 tons of which quantity Great Britain received approximately 86 per cent; the United States, 8 per cent; Germany, 5 per cent; and France, Denmark, Spain and Holland, the remainder. The maximum shipment of 31,753 tons was made in 1890. Since 1899, however, the annual production has exceeded the 1,500 ton mark only once.

The discovery and opening up in the United States of the large phosphate deposits in Florida in the nineties and later of those in Tennessee caused a sharp falling-off in prices for phosphate and resulted in the closing of the large Canadian mines.

The production of Canadian phosphate since 1895 has been mainly obtained as a by-product in the mining of mica.

Activity in the phosphate industry in Canada has been practically negligible for a number of years. In 1927 shipments of phosphate rock amounting to 151 tons valued at \$1,717 were made.

Phosphate produced in Canada during 1930 was in the form of apatite and shipments amounting to 40 tons valued at \$760 were made to the United States from a deposit near Templeton, Quebec. During the year construction was advanced on the new fertilizer plant of the Consolidated Mining and Smelting Company at Trail, B.C.

Exploratory work by the Consolidated Company to prove the phosphate deposits in the eastern section of the Fort Steele mining division in British Columbia has been aggressively continued. These deposits, if proven of economic importance, will be developed as a source of phosphate rock for the new chemical fertilizer plant at Trail. Superphosphate was manufactured in 1930 from imported phosphate in the new fertilizer plant of Canadian Industries at Belœil, Quebec, and in August, 1930, a new fertilizer mixing plant commenced operations at Hamilton, Ontario.

The Soviet Union of Russia reports that extensive investigations into ore resources of the Kola Peninsula, carried on since 1920, have established the fact that the Peninsula possesses one of the most important apatite (phosphate-nephelite) deposits in the world. The work of the apatite trust began in January, 1930, and a flotation plant is being constructed at Khibini; this mill will have a capacity of 1,000 tons of apatite concentrates per day.

Table 304.—Production of Phosphate in Canada, by Provinces, 1921-1930

(For the years 1870 to 1920 see Mineral Production of Canada 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1921.....	30	450			30	450
1922.....	131	1,320	59	476	190	1,796
1923.....	30	600			30	600
1924.....						
1925.....	16	189			16	189
1926.....	40	800			40	800
1927.....	31	399	82	824	151	1,717
1928.....	91	1,126			641	8,276
1929.....	40	800			1,185	5,380
1930.....	40	760			40	760

(a) Includes 38 tons valued at \$494 shipped from British Columbia deposits.

(b) Includes 550 tons valued at \$7,150 shipped from British Columbia deposits.

(c) Includes 1,145 tons valued at \$4,580 shipped from British Columbia deposits.

Table 305.—Production in Canada, Imports and Exports of Phosphate, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	641	8,276	1,185	5,380	40	760
IMPORTS—						
Phosphate rock.....	10,388	68,266	18,192	114,741	47,206	297,522
Acid phosphate (not medicinal).....	1,632	245,518	1,491	223,157	1,263	179,996
Phosphorus.....	21	14,795	39	29,777	43	32,241
Superphosphate or acid phosphate of lime..	97,489	1,188,537	97,925	1,147,839	127,891	1,393,862
EXPORTS—Phosphate rock.....		44	52	1,408		

POTASH

Natural potash salts are not yet mined or recovered commercially in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland county, N.S., and at Gautreau, Westmorland county, N.B. A search for beds of economic importance has been made and results so far obtained have been sufficiently promising to warrant future work. Potassium chloride so far opened up at Malagash occurs in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite.

During 1930 the German potash industry had in operation 40 mines and 30 refining and concentrating plants on a basis of 70 per cent production capacity. Sales of potash by the Potash Syndicate amounted to 1,356,730 metric tons K_2O , as compared with 1,401,400 in 1929. In France the production of potash in Alsace has increased from 350,341 metric tons in 1910 while under German ownership to over 3,100,000 tons in 1930.

Imports of kainite and other German potash salts into Canada during 1930 totalled 2,668 short tons valued at \$62,565 as compared with 603 tons worth \$7,199 in 1929; 34,281 tons of crude muriate of potash valued at \$1,246,638 were imported in 1930 as against 17,001 tons at \$611,121 in 1929; sulphate of potash imports in 1930 totalled 2,069 tons with a value of \$96,094; in 1929 the tonnage was 903 and the value, \$43,277.

The Geological Committee of the U.S.S. Russia report the recent discovery of rich deposits of potassium salts in the Solikamsk-Ust-Usolsk region near Perm. It is stated that the quality of the salts is not inferior and is perhaps superior to the German and there is five times as much potassium per square kilometre as in the Alsace deposits. The estimated output, in Russia, of potassium salts for 1928-1929 is 100,000 tons.

Natro-Alunite.—Natro-alunite occurs at Easy Cove in the Kyuquot section, Quatsino mining division, British Columbia. Small shipments of this mineral have been made from the deposit; the property has been inactive since 1927 when an endeavour was made to develop a trade demand for this product, utilizing its potash content as a fertilizer.

Table 306.—Production of Natro-Alunite in Canada, 1921-1930

Year	Tons	Value
		\$
1921.....	30	1,500
1922.....	50	2,500
1923.....	15	750
1924.....		
1925.....	20	1,000
1926.....		
1927.....	7	243
1928-1930.....		
Total.....	122	5,998

Table 307.—World Production of Potash Minerals, 1928-1930

(Supplied by Imperial Institute)

(Long tons)

Country and Description	Potash Minerals			K ₂ O Content or equivalent		
	1928	1929	1930	1928	1929	1930
BRITISH EMPIRE						
India—						
Nitrate (estimated).....	4,700	4,800	4,000	2,000	2,000	2,000
Australia—						
Alunite.....		38			3	
FOREIGN COUNTRIES						
France—						
K ₂ O Equivalent Sylvinite, etc.—						
12-16%.....	212,080	258,865	205,722	400,218	484,325	498,489
18-22%.....	607,683	699,859	650,748			
50% and over.....	330,720	405,328	467,958			
Germany—						
Kainite, Sylvinite, etc.....	10,266,562	10,824,575	9,935,271	1,467,097	1,540,548	1,406,851
Carnallite, etc.....	2,025,261	2,281,331	1,838,053	197,322	218,992	176,259
Italy—						
Leucite.....	38,600	37,131	40,500	(a)	(a)	(a)
Alunite.....	193	103	812	20	10	80
Poland—						
Kainite.....	144,375	135,681	99,191	14,438	13,568	9,919
Sylvite.....	191,885	217,283	201,591	42,456	48,900	(a)
Russia (years ending Sept. 30)—						
Alunite Clay.....	5,400	(a)	(a)	(a)	(a)	(a)
Alunite (impure).....	1,783	(a)	(a)	(a)	(a)	(a)
Spain—(b)						
Crude salts.....	239,391	240,096	281,912	(a)	(a)	(a)
Nitrified earth.....	837	1,000	900	(a)	(a)	(a)
Abyssinia—						
Crude salts.....	1,300	(a)	(a)	650	(a)	(a)
United States—						
Crude salts.....	92,972	96,268	94,473	53,491	54,991	54,705
Korea—						
Alunite (impure).....	13,580	10,641	11,523	(a)	(a)	(a)
World's total.....				2,180,000	2,360,000	2,200,000

(a) Information not available.

In addition alunite was produced from quarries as follows: 1928-60 cu. metres. 1929-600 cu. metres. 1930-600 cu. metres.

PYRITES

Census returns for 1871 record a production of 2,800 tons of pyrites in Canada, made up of 2,300 tons from Quebec deposits and 500 tons from Ontario. However, it is only since 1886 that a continuous official record of pyrites production is available. Customs' records for the period 1881 to 1885 inclusive, show exports of 120,126 tons of pyrites to the United States. The 1886 output of pyrites was 42,906 tons, all of which was obtained from the Albert and Crown mines, Sherbrooke county, Quebec. In 1889, the production totalled 72,225 tons; shipments ranged from 27,687 tons to 158,566 tons during the following 24 years. The war years, 1914-1918, brought about an increased demand for sulphuric acid and a consequent advance in the production of pyrites. Shipments during this period reached a grand total of 1.6 million tons or approximately 46 per cent of the total Canadian production from 1886 to 1927.

It has been the practice of the Bureau in past years to report export shipments of pyrites in terms of the sulphur content of the pyrites. In view of the fact that there is now an important production of sulphur in the form of sulphuric acid made from waste bessemer gases, it has been decided to modify the method of reporting production to show the total sulphur content of pyrites shipped and of bessemer gases used in the manufacture of sulphuric acid.

The sulphur content of pyrites shipped and of waste bessemer gases used in the manufacture of sulphuric acid amounted in 1930 to 37,730 tons valued at \$314,835 as compared with 42,781 tons valued at \$350,843 in 1929. Pyrites shipments were made from Quebec, Ontario and British Columbia. The total imports of sulphur and brimstone, crude, in roll or flour, during 1930 were recorded at 179,728 tons valued at \$3,177,492, the most of this sulphur came from wells in the salt Dome areas of the Southern States.

Developments in the flash roasting of sulphide ores in paper mills by the Freeman process gives promise for the utilization of sulphides now going to waste from concentrators and milling plants. This process may also make possible the profitable mining of Canadian sulphide deposits now remaining undeveloped or idle.

Table 308.—Production of †Pyrites in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Pyrites	Sulphur Content	Value	Year	Pyrites	Sulphur Content	Value
	tons	tons	\$		tons	tons	\$
1921.....	33,368	12,213	116,326	1926.....	17,845	8,975	63,899
1922.....	18,143	6,900	74,303	1927.....	50,863	25,229	198,388
1923.....	28,591	11,073	113,020	1928.....	68,836	38,589	321,033
1924.....	23,552	9,742	95,620	1929.....		42,781	350,843
1925.....	15,605	7,587	58,899	1930.....		37,730	314,835

† Since 1928 includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making.

Table 309.—Production in Canada, Imports and Exports of Sulphur and Pyrites, 1928-1930.

	1928			1929			1930		
	Tons		Value	Tons		Value	Tons		Value
	† Pyr-ites	*Sul-phur con-tent	* \$	† Pyr-ites	*Sul-phur con-tent	* \$	† Pyr-ites	*Sul-phur con-tent	* \$
PRODUCTION—									
Quebec.....	4,389	1,552	12,061	20,186	9,926	73,119	24,918	12,653	93,038
Ontario.....	464	4,974	54,100	677	4,579	51,516	141	7,277	73,855
British Columbia.....	63,983	32,063	254,872	56,395	28,276	226,208	28,535	17,800	147,942
Total.....	68,836	38,589	321,033	77,258	42,781	350,843	53,594	37,730	314,835
IMPORTS—	Tons		\$	Tons		\$	Tons		\$
Brimstone or sulphur, crude or in roll or flour.....	182,343		2,062,935	234,926		3,789,243	179,728		3,177,492
EXPORTS—									
Sulphur contained in pyrites.....	31,596		249,705	31,987		246,771	26,592		159,866
Sulphuric acid.....	13,329		152,544	8,396		91,634	570		6,530

* Since 1928 includes sulphur content of pyrites and estimated figures for quantity and value of sulphur in smelter gases used for acid making.

† Includes both pyrite ore and pyrite concentrates made from copper ores.

Table 310.—World Production of Pyrites (Including Cupreous Pyrites), 1928-1930

(Supplied by Imperial Institute)

(Long tons)

Country	Pyrites			Estimated sulphur content		
	1928	1929	1930	1928	1929	1930
BRITISH EMPIRE						
United Kingdom.....	4,370	4,371	5,497	(a)	(a)	(a)
Union of South Africa.....	3,695	4,051	3,547	(a)	(a)	(a)
Canada (b).....	61,461	68,980	(a)	34,454	38,197	33,688
Cyprus.....	243,935	292,430	257,028	121,968	144,055	128,692
India.....		294			(a)	
Total.....	313,000	370,000	330,000			
FOREIGN COUNTRIES						
Austria.....	9,842			1,968		
Czechoslovakia.....	23,253	22,642	23,253	9,185	8,943	9,185
France.....	195,320	(c) 198,996	194,536	90,222	(d) 90,023	89,900
Germany.....	336,775	346,351	285,165	143,562	147,614	122,163
Greece.....	92,781	131,292	160,000	44,643	62,941	69,078
Hungary.....	4,155	1,007	1,052	(a)	(a)	(a)
Italy.....	549,571	654,047	705,942	252,630	301,017	309,838
Jugoslavia.....	63,258	60,686	49,550	(a)	(a)	(a)
Norway.....	726,871	727,916	719,407	316,551	319,144	318,965
Poland.....	10,500	9,261	10,872	4,500	4,000	4,700
Portugal.....	238,298	378,279	393,902	120,000	190,000	200,000
Roumania.....	23,340	23,474	23,881	9,000	10,000	10,000
Russia (years ended Sept. 30).....	149,640	(a)	237,900	(a)	(a)	(a)
Spain.....	3,567,570	3,806,172	3,362,507	1,547,000	1,786,000	1,450,000
Sweden.....	19,680	70,917	59,486	12,198	31,575	27,295
Algeria.....	13,607	16,539	16,365	6,295	7,940	7,364
United States (d).....	312,815	333,465	347,512	113,305	120,371	124,226
Japan.....	584,591	608,971	552,532	(a)	(a)	(a)
Total.....	6,900,000	7,500,000	7,200,000			
Grand total.....	7,200,000	7,900,000	7,500,000			

(a) Information not available.

(b) Includes sulphur content of smelter gases used for acid making.

(c) Includes 3,429 tons of arsenical pyrites containing 1,347 tons of sulphur.

(d) Includes by-product pyrites from zinc operations in Wisconsin and New York also pyrite and pyrrhotite concentrates from copper operations in Tennessee.

Table 311.—World Production of Sulphur, 1928-1930

(Supplied by Imperial Institute)

(Long tons)

Country and Description	1928	1929	1930
BRITISH EMPIRE			
United Kingdom and Irish Free State—			
Spent oxide (b).....	174,000	174,500	155,432
New Zealand—			
Sulphur.....	719	967	849
FOREIGN COUNTRIES			
France—			
Sulphur rock (sulphur content).....	24	4	(a)
Greece—			
Sulphur rock.....	299	1,743	2,581
Refined sulphur.....	25	187	(a)
Italy—			
Crude sulphur—			
Fused.....	291,430	318,720	345,024
Ground.....	31,051	21,149	19,409
Spain—			
Sulphur rock.....	75,519	73,029	(a)
Refined sulphur (c).....	20,992	23,588	(a)
United States—			
Crude sulphur.....	1,981,873	2,362,389	2,558,981
Chile—			
Sulphur rock.....	15,423	16,043	(a)
China (estimated)—			
Sulphur.....	3,000	3,000	3,000
Formosa—			
Sulphur.....	768	467	(a)
Japan—			
Sulphur rock.....	13,109	14,869	14,392
Refined sulphur.....	68,956	64,430	61,375
Netherlands and East Indies—			
Sulphur.....	364	1,535	5,516

(a) Information not available.

(b) Consumed by the sulphuric acid industry, average sulphur content was approximately—

1928.....	48.8%
1929.....	48.8%
1930.....	48.6%

(c) Partly from imported crude ore.

SULPHURIC ACID

Production of 66 degree Bé sulphuric acid in Canada in 1930 totalled 107,352 tons valued at \$1,347,525 at the works as compared with 110,749 tons worth \$1,375,599, in 1929. Exports of sulphuric acid from Canada amounted to 570 tons worth \$6,530 in 1930 as against 8,397 tons valued at \$91,634 in the previous year; practically all of this acid was shipped to the United States. Imports totalled only 149 tons appraised at \$13,612 and 111 tons at \$10,287 in 1929.

Eight Canadian plants manufactured sulphuric acid during 1930; three plants utilized smelter gases while the remainder consumed 8,241 tons of iron pyrites and 20,233 tons of imported sulphur. Acid was made in plants located in Ontario at Coniston, Copper Cliff, Hamilton and Sulphide; in British Columbia at New Westminster, Trail, and Barnet, and in Nova Scotia at Sydney.

The Canadian Industries Limited have completed a new sulphuric acid plant at Copper Cliff, this employs the contact process in the manufacture of acid from converter gas. The plant has a capacity of 50 tons per day and is one of the most modern acid plants in existence.

At Trail, in British Columbia, zinc roaster gases are converted into sulphuric acid by the contact process. This plant is being increased to supply acid to the new fertilizer works. When this enlarged plant is in operation more than 30 per cent of the sulphur dioxide output of the Trail plant will be utilized. This reduction in escaping gases is expected to have a great effect in mitigating smoke damage.

Table 312.—Production, Imports and Exports of Sulphuric Acid, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Sulphur used.....	18,903	331,806	25,978	542,194	20,233	434,440
Pyrites used.....	18,494	88,885	10,461	53,008	8,241	46,883
Acid made*.....	96,227	1,077,836	110,749	1,375,599	107,352	1,347,525
IMPORTS of acid.....	55	8,652	111	10,287	149	13,612
EXPORTS of acid.....	13,329	152,544	8,397	91,634	570	6,530

* Expressed in terms of 66° Bé acid. Includes also the production of the Canadian Industries, Ltd., at Coniston, Ont., who now produce sulphuric acid from waste smelter gases.

SILICA BRICK

Silica brick are produced in Canada at Sydney, Nova Scotia, and Sault Ste. Marie, Ontario. The Nova Scotia raw material is obtained from a quarry located at Leitches Creek in Cape Breton county. In Ontario the quartz is extracted from a quarry in Deroche township, and is used in the production of refractory brick for the lining of steel furnaces.

The total production during 1930 amounted to 2,418 thousand valued at \$97,379. The imports of silica brick during 1930 were valued at \$315,039.

SODIUM CARBONATE

The commercial deposits of natural sodium carbonate now being worked in Canada occur on the line of the Pacific Great Eastern Railway in the Clinton mining district of British Columbia, in the vicinity of 70 Mile House. Small annual shipments have been recorded from the British Columbia deposits since 1921; the maximum production, 1,120 tons valued at \$8,140, being shipped in 1925. During 1930 shipments amounted to 364 tons valued at \$4,550 as compared with 600 tons worth \$8,100 shipped in 1929.

Sodium carbonate is used largely in chemical and hydro-metallurgical plants. Its principal uses are, in the manufacture of glass, soap and paper; the bleaching and washing of linen, cotton, wool, etc., and the dyeing and printing of fabrics. Sodium carbonate has been utilized for some time as a means of removing, and of preventing the formation of boiler scale.

Soda ash from salt brine is made in Canada on a very large scale by Brunner Mond Company Limited, at Amherstburg, Ontario.

The British Columbia Chemical Company have erected a plant at Last Chance Lake, in the Clinton Mining Division, for the manufacture of soda ash from local lake deposits of sodium carbonate.

Table 313.—Production of Natural Sodium Carbonate in Canada, 1921-1930

Year	Tons	Value \$
1921.....	197	14,775
1922.....	202	3,027
1923.....	265	3,975
1924.....	510	5,173
1925.....	1,120	8,140
1926.....	555	5,370
1927.....	805	9,895
1928.....	519	4,922
1929.....	600	8,100
1930.....	364	4,550
Total.....	5,177	68,027

SODIUM SULPHATE

Sodium sulphate is found in all degrees of purity in Western Canada. The material produced may be hydrated sodium sulphate (mirabilite) known as Glauber's salt or anhydrous sodium sulphate (thenardite) sold to the trade as salt cake. During 1930 shipments in Canada from deposits in Saskatchewan were valued at \$293,847 as compared with \$64,112 in 1929. The first plant in Canada designed and constructed for the direct production of nitre cake, sodium acid sulphate, as a direct product, was brought into operation at Copper Cliff, Ontario, by the Canadian Industries in July, 1930. Sodium sulphate from the lake deposits in Saskatchewan is treated here by sulphuric acid in the production of nitre cake for use in the metallurgical treatment of nickel ores by the International Nickel Company Limited. Sodium sulphate is used extensively in the pulp and paper, glass, dye, and textile industries and to a smaller extent for medicinal and tanning purposes.

One of the largest known deposits of natural sodium sulphate in the world is at Inglebright lake in Saskatchewan. It is stated that there are several million tons of sodium sulphate in these deposits.

Table 314.—Production of Natural Sodium Sulphate in Canada, 1921-1930

Year	Tons	Value \$	Year	Tons	Value \$
1921.....	623	18,850	1927.....	5,659	11,319
1922.....	504	11,980	1928.....	6,016	68,804
1923.....	733	10,189	1929.....	5,018	64,112
1924.....	1,082	6,004	1930.....		293,847
1925.....	3,876	19,380	Total.....		518,035
1926.....	6,775	13,550			

Table 315.—Production in Canada and Imports of Sodium Sulphate, 1928-1930

	1928		1929		1930	
	Tons	Value \$	Tons	Value \$	Tons	Value \$
PRODUCTION—						
Natural Sodium Sulphate—						
Crude.....	6,016	68,804	5,018	64,112		293,847
IMPORTS—						
Soda, bisulphate of, or nitre cake.....	36,561	311,606	80,872	1,081,984	15,275	219,173
Soda, sulphate of, crude, known as salt cake.....	38,835	445,244	39,512	514,212	24,553	395,236
Glauber's salt.....	356	5,386	362	4,450	747	9,664
Soda ash or barilla.....	1,160	38,890	1,645	44,300	1,520	45,310

CHAPTER NINE

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, Slate, and Stone.

During the past twenty-three years the production in the clay products and other structural materials industries has increased from a valuation of \$12,863,049 in 1907 to \$53,727,465 in 1930. Owing to widespread business depression and curtailment in construction programs, the value of the 1930 output in these commodities showed a considerable recession from the record of \$58,534,834 in 1929. Cement production in Canada in 1887 amounted to 69,843 barrels worth \$81,909; in 1930 the total was 11,032,538 barrels valued at \$17,713,067 as against 12,284,081 barrels worth \$19,337,235 in 1929. Shipments of lime in 1886 were valued at \$283,755 whereas in 1930 the valuation reached the impressive figure of \$4,038,698, the latter valuation, however, showed a decline in value of \$1,869,912 from the high record production of 1929. The stone industry has also shown a very substantial growth; data for 1886 place the value of stone production at \$723,593 while in 1930 the valuation of Canadian stone output amounted to \$13,034,209. Sand and gravel production records date back only to 1912; shipments during that year were valued at \$1,512,099 or only 18 per cent of the 1930 total of \$8,344,913.

Contracts awarded for building and construction in Canada in 1912 as reported by the *MacLean Building Review* were valued at \$463,083,000. In 1913 contract awards totalled \$384,157,000, and in the following years a decrease to \$241,952,000 was recorded. During the war period (1915-1918) construction was largely neglected and the value of building awards remained below the one hundred million dollar mark. A revival of building set in after the war, and in each year since 1920, the volume of building has been well above the two hundred million dollar mark.

The value of all contracts awarded during 1930 as compiled by the MacLean Building Reports, Limited, amounted to \$456,999,600 as compared with \$576,651,800 in 1929. While this is a decrease of 20.7 per cent it must be kept in mind that 1929 was the most active year that Canada has ever known and was 22.1 per cent in excess of 1928, the second highest year ever recorded for Canadian construction.

Table 316.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1928-1930

Province	1928	1929	1930
	\$	\$	\$
Nova Scotia.....	997,331	1,334,934	1,239,306
New Brunswick.....	400,140	585,696	624,012
Quebec.....	16,849,955	18,424,828	17,966,698
Ontario.....	20,438,279	25,001,461	21,812,563
Manitoba.....	3,166,797	4,291,397	4,284,457
Saskatchewan.....	809,371	1,190,168	1,101,062
Alberta.....	3,478,580	3,665,321	2,646,327
British Columbia.....	3,596,728	4,041,029	4,053,040
Canada.....	49,737,181	58,534,834	53,727,465

Table 317.—Production, Imports, Exports and Apparent Consumption of Clay Products and Other Structural Materials in Canada, 1928-1930

Item		Production	Imports	Exports	Apparent consumption
		\$	\$	\$	\$
Cement, portland and manufactures of.....	1928	16,739,163	177,758	340,624	16,576,297
	1929	19,337,235	254,111	252,955	19,338,391
	1930	17,713,067	604,520	212,071	18,105,516
Clay and clay products.....	1928	12,381,718	10,023,747	284,518	22,120,947
	1929	13,904,643	12,159,566	375,506	25,688,703
	1930	10,593,578	10,196,681	449,120	20,341,139
Lime.....	1928	4,534,568	64,811	357,085	4,242,294
	1929	5,908,610	49,395	428,209	5,529,796
	1930	4,038,698	28,107	44,728	4,022,077
*Sand and gravel.....	1928	5,809,431	607,660	232,422	6,184,669
	1929	7,317,814	707,476	441,798	7,583,492
	1930	8,344,913	520,438	468,380	8,396,971
Slate.....	1928	.....	239,296	.....	239,296
	1929	.....	296,638	.....	296,638
	1930	3,000	205,978	.....	208,978
Stone.....	1928	10,272,301	1,550,447	250,215	11,572,533
	1929	12,066,532	2,068,453	237,121	13,897,864
	1930	13,034,209	1,740,558	277,258	14,497,509
Total.....	1928	49,737,181	12,663,719	1,464,864	60,936,036
	1929	58,534,834	15,535,639	1,735,589	72,334,884
	1930	53,727,465	13,296,282	1,451,557	65,572,190

*Sand and gravel imports include silica sand for glass and carborundum manufacture and for use in steel plants. This was valued at \$352,796 in 1930.

CEMENT

Although the first official record of the production of cement in Canada is that of the manufacture of hydraulic cement from the black limestones of Quebec in 1856, it is understood that lime and hydraulic cement were made at Hull between 1830 and 1840. The cement was manufactured from a grey argillaceous magnesian limestone obtained nearby. Plants were also operated at an early date at the mouth of the Magdalen river, Gaspé county, and in Argenteuil county, Quebec; in Ontario, at Kingston and Thorold.

It was not until 1887 that serious competition to the domestic production showed itself in large importations of Portland cement. In order to cope with this competition two Canadian manufacturers of natural cement changed their mills and processes. Canadian Portland cement made its appearance on the market in 1889. Two additional plants were constructed about this time; one at Shallow Lake, Ontario, and another at Longue Pointe, Quebec.

The period 1898 to 1905 witnessed a boom in the construction and promotion of cement plants in Canada. Eleven marl plants were erected during these years, of which only three were really successful.

In Nova Scotia puzzolan cement was first produced from blast furnace slag and lime, at Sydney, in 1905. This plant was closed down in 1915, re-opened in 1920, but has been idle since 1921.

Hydraulic cement was made at the Wright plant in Hull, Quebec, between 1830 and 1840. This cement sold at prices ranging between \$1.50 and \$2.50 per barrel of 300 pounds. Only natural cement was produced at this plant until the invasion of the Canadian market by imported Portland cement necessitated the changing of the processes in order to retain the local business. In 1889, the first Portland cement produced by this concern was placed on the market. Operations were carried on until the destruction of the plant by fire in 1900.

During 1888, a small plant was erected at Pointe Claire, near Montreal; a small quantity of Portland cement was produced but the operations were not successful and were discontinued. A plant was constructed in 1889 at Longue Pointe on the bank of the St. Lawrence river, east of Montreal and early the following year shipments of Portland cement commenced. The first

dry process rotary kiln used in Canada was installed at this plant in 1899. Eight years later, the Vulcan Company purchased this property and built a new mill with the most modern equipment. Operations at this plant also ceased in 1914.

The construction of the International plant at Hull was started in 1903 and within two years shipments were being made. This plant was enlarged in 1908, and the following year it became a unit in the large merger company. Owing to lack of market, because of the war, the plant was closed in 1914. Considerable work was done on the mill in 1925, and in June, 1926, operations recommenced. Cement is now being made by the wet process at this plant.

A new plant was started in 1907 on the north side of the St. Lawrence river near the eastern limit of Montreal. Within two years the company was absorbed by the Canada Cement Company, Ltd., a consolidation of thirteen plants in Canada. Very extensive alterations and additions were made to this plant, and it has been in continuous operation since 1909.

In August, 1925, the Unic plant was opened up at St. François de Sales, about 20 miles northeast of Montreal, operations ceased here in 1926.

The National plant at Montreal East commenced shipments in 1926.

In Ontario cement was produced at Napanee Mills (now Strathcona) in 1867. Clinker was made in kilns at this place and hauled by wagons to Napanee for grinding and packing. A new plant was constructed at Napanee Mills in 1891 for the production of Portland cement from marl and clay. Marl was transported 25 miles by rail from Marlbank and clay was obtained locally. Operations at this Strathcona mill commenced in December, 1891. During the same year a small Portland cement plant was erected at Marlbank which obtained its raw materials from Lime Lake. The following year, the Marlbank plant was opened up and operated until 1898 when it was remodelled. In 1900 the Strathcona and Marlbank plants were taken over by a new company, and three years later the Marlbank mill was enlarged and improved, with the result that, in 1904, the Strathcona mill was closed permanently. Marlbank operations continued only until 1914, since then the plant has been dismantled.

A company was incorporated in April, 1888, for the purpose of making Portland cement at Shallow lake, Ontario. At that time the rotary kiln was a new departure in the cement industry in England and one of these kilns was purchased and put into operation at the newly erected plant. After many vicissitudes, the company was re-organized in 1902; new equipment was obtained, and operations were made commercially successful. The plant was active until 1914 but it has since been dismantled.

The Hanover plant in Ontario was built in 1898 to use marl and clay as raw materials. Marl was used at this plant until 1920 when it was replaced by limestone shipped by rail from Walkerton. In September, 1925, the mill was closed.

The Lakefield plant, in Ontario, another marl and clay proposition, was erected in 1901, and operated until 1914. This plant has been rebuilt and is again in operation, using limestone.

Another mill was commenced in 1907 at Point Anne, near Belleville, shipments were started in the following year. Since that time the plant has been enlarged and operations have been carried on continuously.

Construction of a new plant at Port Colborne, near the lake Erie entrance to the Welland canal was started in 1907 and shipping commenced during 1908. In 1909, it became a unit of the merger company and was enlarged considerably; operations have been maintained since that date.

A departure from the dry process employed in the rock plants was instituted in 1912 when the St. Mary's mill was brought into operation using the wet process. This concern has been active during the past 18 years and is still a large producer.

Records for 1869 show two cement plants in Ontario, with an investment in plant and machinery of \$28,000, operating at Thorold and Napanee Mills and producing products valued at \$3,825. The following year these two plants employed 26 men and produced \$4,950 worth of products. In 1871 employment was furnished 28 men and the value of the mill output was \$11,700. The growth of the industry through the natural cement stage to the final concentra-

tion of the producers on the manufacture of Portland cement may be traced by the inception and subsequent disappearance of many companies. An idea of the magnitude of the industry can be obtained by a glance at the data for 1913 after consulting the figures for the earlier years, and then comparing these with the statistics for 1925 and 1927. In 1913 the 14 Ontario plants with a production of 3,992,998 barrels, employed 1,382 men earning \$955,729, and in 1925 the 4 plants operating produced 3,462,358 barrels at \$5,253,911, employed 749 men whose wages totalled \$1,018,915. Incidentally the capital actually employed in 1925 was \$12,513,281. During 1930 four plants were operated, their locations being Belleville, Port Colborne, Lakefield and St. Mary's. The production amounted to 3,942,690 barrels with a valuation of \$5,779,404.

Cement production in Manitoba started with the manufacture of the natural product. The first plant was built at Arnold but the operations here ceased years ago. Babcock, a few miles from Arnold, was the site for another mill which was constructed in 1906. This plant was idle in 1930. The construction of a plant at Tuxedo (Fort Whyte) 9 miles southwest of Winnipeg was started in 1911. For two years this plant used clinker produced near Belleville, Ontario. Since 1913 this mill has been using limestone obtained from a quarry at Steep Rock on the east shore of Lake Manitoba, 145 miles north of Winnipeg. Cement is made here by the wet process.

Plants were erected at Calgary and Exshaw, Alberta, in 1906 and 1907. Raw materials for the former mill consisted of limestone hauled by rail from The Gap, some 60 miles west and shale from Sandstone, 20 miles south. The Exshaw mill, located 60 miles west of Calgary, uses limestone from a deposit close to the plant and shale which is transported by rail three miles from Kananaskis. In 1914 the Calgary mill was closed down and it has since been dismantled. A dry process plant was erected at Blairmore in 1909; it changed hands in 1919 but owing to insufficient demand for cement in the district, the plant has remained idle since that date.

A marl plant was built in 1912, at Marlboro about 140 miles west of Edmonton. Five years later a change was made to dry process, using limestone obtained from the mountains to the west, and local clay. Shipments have been made annually from this plant since 1917.

Work was commenced on a new plant at Medicine Hat in 1913 but the construction had not been completed before the outbreak of war in 1914 and the changed conditions caused the suspension of further work on this building.

The Canadian Pacific Railway Company was the first to attempt to manufacture cement in British Columbia. About the year 1891 this company started the replacement, on a large scale, of the original wooden structures on the mountain section of its line, using in this work large quantities of masonry. The cement required was very costly, as it was all brought from England in sailing vessels which made the long, slow trip around Cape Horn. In an effort to reduce this cost the company decided to investigate the possibility of making cement at or near Vancouver, and for this purpose brought out from the Isle of Wight an experienced cement maker and chemist, who, after examining various materials available, made a favourable report, and in 1893, was commissioned to build a small plant on a site selected on the water front at Vancouver. Limestone was brought by barge from Texada island, about forty miles northwest of Vancouver, clay by rail from a cutting about thirty miles east, and coal by barge from the Dunsmuir mines on Vancouver island. The limestone was burned in simple kilns and then mixed with clay and water to form a slurry which was dried on a floor of iron plates with fires underneath. The dried slurry was burned in upright kilns and the clinker was ground by burr stones. The cement is said to have been of excellent quality and was used in thousands of yards of masonry which is still in good condition. This plant was in operation about ten years, after which it was dismantled.

In 1904, the Vancouver Portland Cement Company, Limited, built a rotary kiln plant at Tod Inlet on Vancouver island, and in 1912 the Associated Portland Cement Company (Canada), Limited, erected a similar plant at Bamberton, B.C. In 1916, these companies were united under the name of The British Columbia Cement Company, Limited.

In 1912, another plant was built near Princeton, the company operating it went into liquidation in 1914 and the plant has since been dismantled.

Cement was produced in 1930 at plants located in Quebec, Ontario, Manitoba, Alberta, and British Columbia. Mills in Quebec produced 44 per cent of the total Canadian shipments; Ontario, 36 per cent; Manitoba, 9 per cent; Alberta, 5 per cent; and British Columbia, 6 per cent. Total shipments from Canadian cement plants during the year totalled 11,032,538 barrels valued at \$17,713,067 as compared with 12,284,081 barrels worth \$19,337,235 in the preceding year. This recession, in both quantity and value, from those of 1929, a high record year, reflects the severe industrial depression experienced throughout the world in 1930.

Imports of Portland cement into Canada during 1930 amounted to 143,436 barrels averaging \$3.97 per barrel; in 1929 the average value was \$3.38 per barrel. Portland cement exports were recorded at 198,736 barrels valued at \$212,071. Cement made available for consumption in Canada amounted to 10,977,238 barrels in 1930.

Fifty-seven rotary kilns possessing a total daily capacity of 37,522 barrels were in operation during 1930; 74,227 tons of gypsum and 2,925,399 tons of limestone were consumed and a total expenditure of \$4,120,367 was incurred for fuel and electricity.

Table 318.—Production of Cement in Canada, 1921-1930

(For the years 1887 to 1920 see Mineral Production of Canada, 1928)

Year	Barrels	Value	Year	Barrels	Value
		\$			\$
1921.....	5,752,885	14,195,143	1926.....	8,707,021	13,013,283
1922.....	6,943,972	15,438,481	1927.....	10,065,865	14,391,937
1923.....	7,543,589	15,064,661	1928.....	11,023,928	16,739,163
1924.....	7,498,624	13,398,411	1929.....	12,284,081	19,337,235
1925.....	8,116,597	14,046,704	1930.....	11,032,538	17,713,067

Table 319.—Output, Sales, Imports, Exports and Consumption of Cement in Canada, 1928-1930

	1928		1929		1930	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
OUTPUT.....	11,076,659	.....	12,252,203	.....	11,790,408	.....
SOLD OR USED.....	11,023,928	16,739,163	12,284,081	19,337,235	11,032,538	17,713,067
STOCKS DEC. 31.....	1,520,583	.....	1,488,751	.....	2,246,621	.....
IMPORTS—						
Portland cement.....	34,047	146,164	55,980	189,169	143,436	569,848
Manufactures.....	.....	31,594	.....	64,942	.....	34,672
EXPORTS.....	267,325	340,624	234,111	252,955	198,736	212,071
APPARENT CONSUMPTION.....	10,790,650	.....	12,105,950	.....	10,977,238	.....

Table 320.—Production of Cement in Canada, by Provinces, 1928-1930

Province	1928		1929		1930	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	4,913,820	6,305,396	5,169,408	7,120,374	4,865,609	7,031,528
Ontario.....	3,911,795	5,520,897	4,624,712	6,608,246	3,942,690	5,779,404
Manitoba.....	693,450	1,085,084	1,000,258	2,350,606	877,906	2,268,742
Alberta.....	834,067	1,732,582	808,796	1,770,786	525,289	1,144,160
British Columbia.....	670,796	1,495,204	680,907	1,487,223	721,044	1,489,233
Canada.....	11,023,928	16,739,163	12,284,081	19,337,235	11,032,538	17,713,067

Table 321.—Capital Employed in the Cement Industry in Canada, 1929 and 1930

	1929	1930
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	39,007,891	52,048,878
Cost of supplies and stocks on hand.....	3,968,456	3,478,954
Cash, trading and operating accounts and bills receivable.....	7,905,471	3,682,905
Total.....	50,881,818	59,210,737

Table 322.—Employees, Salaries and Wages in the Cement Industry in Canada, 1929 and 1930

Class	1929		1930	
	Number of employees	Salaries and wages \$	Number of employees	Salaries and wages \$
SALARIED EMPLOYEES.....	124	260,579	126	267,003
WAGE-EARNERS.....	2,422	3,263,016	2,191	2,905,195
Total.....	2,546	3,523,595	2,317	3,172,198

Table 323.—Wage-Earners in the Cement Industry in Canada, by Months, 1929 and 1930

Month	1929	1930	Month	1929	1930
January.....	2,190	1,986	July.....	2,619	2,443
February.....	2,087	1,936	August.....	2,613	2,368
March.....	2,220	1,948	September.....	2,447	2,244
April.....	2,239	2,121	October.....	2,435	2,059
May.....	2,432	2,366	November.....	2,428	1,920
June.....	2,555	2,376	December.....	2,250	1,864

CLAY AND CLAY PRODUCTS

Under "Clay and Clay Products" there have been included statistics relating to production in Canada from domestic clays, of (a) fireclay; (b) fireclay blocks and shapes; (c) firebrick; (d) brick made by the different processes, such as the soft mud process, stiff mud process and dry press; (e) structural tile, such as hollow blocks, roofing tile, floor tile (quarries), and ceramic or glazed floor and wall tile; (f) drain tile; (g) sewer pipe, including copings, flue linings, etc., and (h) pottery.

The clay products industry has been carried on in Canada for many years; census records for 1871 show 426 brick and tile producers in Canada, employing 3,073 workers whose wages totalled \$399,698. The value of products made in that year was \$925,235. Corresponding with the growth of the country, ten years later the number of plants in operation had risen to 560, with a payroll of 4,129 employees, wages amounting to \$608,690 and a production value of \$1,541,892. Statistics for 1886, record 261 brick and 82 tile plants in operation with a total output valued at \$1,126,057. Building brick (common and pressed) was produced in increasing quantities from the beginning of the century; 1900 recorded a valuation of \$2,275,000 while in 1906, the sum of \$4,102,590 was realized from the sale of these products. Almost similar conditions applied to the activities of the plants producing other clay products.

The value of domestic clay and clay products sold by 191 Canadian producers during 1930 declined 23·8 per cent below the preceding year. Sales in 1930 reached a total value of \$10,593,578 as compared with \$13,904,643 in 1929. Ontario was the leading producing province, accounting for 49 per cent of the total sales during the year. Quebec production contributed 23 per cent and the other provinces in order of their production values were Alberta, British Columbia, Nova Scotia, Saskatchewan, Manitoba and New Brunswick.

Canada's imports of clay and clay products during 1930 were valued at \$10,196,681 as compared with \$12,159,566 during the preceding year; the 1930 importations from the United States were valued at \$4,450,331; from the United Kingdom, \$3,966,890; from Japan, \$422,155; from Czechoslovakia, \$381,495; from Germany, \$381,277; from France, \$339,514, and minor amounts from other countries. Pottery and chinaware imports accounted for 52.1 per cent of the total clay and clay products importations; refractory brick, 20.3 per cent; clays, 6.8 per cent; sanitary ware, 5.6 per cent; building bricks and blocks, 3.8 per cent; and porcelain insulators, 3.5 per cent.

Exports from Canada of clays, building bricks, porcelain insulators, earthenware and other clay manufactures were valued at \$449,120 as compared with \$375,506 in 1929. The United Kingdom received 53.2 per cent of these exports.

Tests conducted by the Ontario Department of Mines have established the fact that the cretaceous clays of the Mattagami river in northern Ontario, will make an average first-quality firebrick, the clay can not be used alone but will require about 40 per cent or more of grog.

In the Ceramics Division of the Mines Branch of the Department of Mines, Ottawa, general investigations covering some particular branch of the ceramic industries are continuous; the cost of burning brick and tile was investigated at a large number of representative Canadian plants and a general investigation of the refractories with a review of the fireclay resources of the country was recently commenced.

Brick.—Common and pressed brick produced in Canada during 1886 had a value of \$873,600; the plants in operation were located in Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, North West Territories and British Columbia. Progress in the brick industry was recorded during the succeeding twenty years and in 1906 the value of common and pressed brick produced reached a total of \$4,102,590. In the following year, data were obtained segregating the production of these two classes of brick: 439,016,000 common brick valued at \$3,455,524 and 78,922,000 pressed brick worth \$794,722 were shipped during 1907.

Common brick production reached its highest point in 1912 when 769,192,000 at an average value of \$9.11 per thousand, were shipped. During the same year pressed brick production established a record at 125,180,000 with an average value of \$12.86 per thousand. Since 1917, the value per thousand has never fallen as low as the average price in 1912.

Paving brick production in Canada was first recorded in 1897 when 4,568,000 were shipped by plants at Toronto, Ontario. During the period 1899-1907, the average annual production was 3,917,000. Prior to 1914 the total Canadian output of paving brick came from West Toronto, Ontario, where shale from the banks of the Humber river was used. In 1914, 1915 and 1916 the Clayburn plant in British Columbia produced a small quantity. In 1916 a plant at Edmonton, Alberta, produced a small quantity of paving brick. During the succeeding five years there was no production, but in 1922, the Clayburn plant shipped 151,000. Production ceased until 1926, when the British Columbia plant made shipments of 122,000 paving brick. In the following year a small shipment was made from this plant. The 1930 shipments consisted of 8,800, all from the Clayburn plant.

Stoneware and Pottery from Domestic Clays.—Records for 1888 show shipments of pottery from Canadian plants valued at \$27,750; within the next four years the production had increased to nearly ten times that value. Production thereafter varied but remained above \$100,000 each year to the end of 1911. From 1912 to 1916, values ranged between \$35,371 and \$64,900. During the following years a considerable improvement was revealed in annual sales. In 1930 a valuation of \$294,866 was recorded as compared with \$323,194 in the previous year.

Plants with total assets of \$672,851 were engaged primarily in the production of stoneware and pottery from Canadian clays in 1930. Employees in the industry totalled 156 persons whose earnings were \$153,750.

In New Brunswick, a plant at Saint John produces stoneware, Rockingham ware and flower pots from Canadian clay. Flower pots are also produced from local clays at Toronto and Hamilton, Ontario; Medicine Hat, Alberta, and at Vancouver and Victoria, British Columbia. Pottery and decorated art ware are produced by the Medalta Potteries Limited, Medicine Hat, Alberta.

Fireclay.—Clays from the Drummond Colliery at Westville, Nova Scotia, and from Flower Cove, New Brunswick, have been used for the manufacture of refractory products.

In Quebec, the discoloured portions of the kaolin found at St. Rémi d'Amherst can be utilized as a fireclay.

Cretaceous deposits of refractory clays in the valleys of the Abitibi, Mattagami and Missinabi rivers, which flow northward on the James Bay slope, in Ontario, have been known for many years. The recent extension of the Temiskaming and Northern Ontario Railway from Cochrane to Moose Factory may prove instrumental in the possible economic development of these clays.

Semi-refractory shale is found in Turtle Mountain, at La Rivière and near Virden in the Assiniboine valley, Manitoba.

Refractory and semi-refractory clays occur in southern Saskatchewan. At Claybank in the Dirt Hills, south of Moose Jaw, standard firebrick, special shapes and face brick, are made from local clays. Similar clays are found near Michellton at Willows, south of Twelve Mile Lake, and along the Frenchman river valley in the Cypress hills.

Along the Athabasca river, near Fort McMurray, refractory and semi-refractory clays are found associated with tar sands.

A very important deposit of fireclay occurs in Sumas Mountain about 40 miles eastward from Vancouver, British Columbia; at Clayburn, refractory products are made from this clay. Refractory shales also occur near Whonnoek and a residual fireclay deposit at Kyuquot, Vancouver Island, is operated; this clay is shipped to Victoria for the manufacture of stove linings and sewer pipe.

In 1889, the first production of fireclay in Canada was recorded at 400 tons valued at \$4,800. The maximum tonnage production for the industry was reached in 1917 when 10,534 tons were shipped. During 1930 total shipments from Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia amounted to 2,870 tons valued at \$25,975. Imports of fireclay into Canada in 1930 totalled 57,369 tons evaluated at \$240,293.

Firebrick.—Firebrick production in Canada from domestic clays reached its highest in 1917 when 8,192,000 were produced with an average selling value of \$24.31 per thousand. Although sales have been smaller during the following years, higher prices prevailed and thus the 1917 aggregate valuation has been exceeded annually until 1930. During 1930 Saskatchewan, Alberta and British Columbia plants shipped 3,789,000 firebrick valued at \$177,608.

Fireclay Blocks and Shapes.—Plants in Nova Scotia, New Brunswick, Saskatchewan and British Columbia produce special fireclay blocks and shapes from domestic clays. In 1907 the output of this class of refractory products was valued at \$18,000. Production increased and in 1930 a record for the industry was established with a valuation of \$147,309, an increase of \$16,898 over the previous record of \$130,411 established in 1929.

Plants in Canada, located at Montreal, Saint Johns, Toronto, Port Robinson and Hamilton, produce special refractory blocks and shapes from imported clays.

Drain Tile.—Data regarding the production of drain tile in Canada are available since 1891. From information obtained by the *Ontario Department of Mines*, production during that year was valued at \$90,000. Ten years later production had increased until a valuation of \$250,000 was reached. During 1930 drain tile shipments totalled 25,291,000 valued at \$687,070.

Kaolin.—Deposits of kaolin at St. Rémi d'Amherst were first noted by the Geological Survey in 1894. Two years later samples were shipped to porcelain plants at Trenton, New Jersey, but it was not until 1911 that any serious attempt was made to develop this property. Production commenced in 1912, when 20 tons were shipped. Increases were recorded annually until the maximum production of 1,750 tons for the industry was reached in 1916. Shipments continued up to 1923, in which year, 163 tons were sold. No commercial shipments of kaolin have been made from Canadian deposits since 1923. During 1927 and 1928 small shipments were made from the St. Rémi d'Amherst deposit for testing purposes.

Some development work was done during 1925 and 1926 on the china clay deposits on the Mattagami river, near Long Falls, Temiskaming district, Ontario.

Other Clays.—A shipment of 30 tons of bentonite valued at \$150 was made in 1926 from Princeton, British Columbia; in 1928, a further shipment of 20 tons was made. During 1926 development work was done near Williams lake, British Columbia, on a deposit of a refractory material known locally as kaolin but described merely as "silicate of alumina" by the Provincial Mineralogist; 129 tons valued at \$1,900 were produced. This material was shipped to Vancouver, British Columbia, where some was used in the manufacture of plastic firebrick and refractory cements, and some directly as fireclay. Some small shipments of white ball clay have been made to the United States from Saskatchewan deposits.

Production of "Haydite", a patented building material, began in Ontario in the spring of 1929. The process involves the burning of shale or clay to clinker, the gases formed cause expansion of the clay or shale into a light weight, vitrified, cellular product. The clinker is crushed and screened, the product may be used as aggregate for concrete or moulded into blocks.

Sewer Pipe.—Records of sewer pipe production in Canada date back to 1888 when shipments of this commodity were valued at \$266,320. Production during the succeeding years varied considerably until in 1907 a valuation of \$667,100 was recorded. Seven years later, 1914, the sewer pipe production was valued at \$1,104,499.

In 1930 sewer pipe, copings, and flue linings to a value of \$1,721,815 were shipped from plants in Nova Scotia, Quebec, Ontario, Alberta, and British Columbia.

Structural Tile.—Records of the production of structural tile in Canada include such items as hollow blocks (fireproofing and load-bearing tile), roofing tile, and floor tile. Hollow blocks are produced in every province except Prince Edward Island.

Roofing tile is made in Ontario and floor tile (quarries) in both Ontario and Saskatchewan. The total production of structural tile in Canada during 1930 was valued at \$1,724,369 as compared with a value of \$2,289,198 in the previous year.

In this section all tables except Table 326 show data for domestic clay products only.

Table 324.—Production of Clay Products in Canada from Domestic Clays by Provinces, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Prince Edward Island	Nova Scotia	New Brunsw- wick	Quebec	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1921.....		361,761	66,600	1,744,760	5,183,125	208,982	166,244	710,477	415,869	8,857,818
1922.....	3,975	427,643	75,425	2,494,236	6,944,218	210,740	134,704	700,063	447,452	11,438,456
1923.....		413,974	62,587	2,439,598	6,270,615	160,134	119,405	590,565	426,138	10,483,016
1924.....	3,340	355,948	74,994	2,435,695	5,089,299	117,450	137,280	540,477	460,594	9,215,077
1925.....	3,020	422,690	69,473	2,426,887	5,195,084	173,794	95,952	618,860	523,931	9,529,691
1926.....		362,667	75,851	2,702,298	5,356,469	248,497	214,113	804,933	592,495	10,357,323
1927.....		416,417	87,185	2,734,738	5,853,035	201,464	311,204	889,358	679,788	11,173,189
1928.....		496,577	72,192	3,097,295	6,177,664	291,791	377,896	1,162,264	706,039	12,381,718
1929.....		653,157	160,006	3,187,702	6,830,162	362,240	502,522	1,342,427	866,427	13,904,643
1930.....		495,333	162,536	2,464,044	5,221,214	215,967	349,283	997,685	687,516	10,593,578

Table 325.—Production of Clay Products in Canada, from Domestic Clays, by Provinces, 1928-1930

Province	1928		1929		1930	
	Sold or used	Per cent of total value	Sold or used	Per cent of total value	Sold or used	Per cent of total value
	\$		\$		\$	
Nova Scotia.....	496,577	4.01	653,157	4.70	495,333	4.7
New Brunswick.....	72,192	0.58	160,006	1.15	162,536	1.5
Quebec.....	3,097,295	25.02	3,187,702	22.93	2,464,044	23.3
Ontario.....	6,177,664	49.89	6,830,162	49.12	5,221,214	49.3
Manitoba.....	291,791	2.36	362,240	2.61	215,967	2.0
Saskatchewan.....	377,896	3.05	502,522	3.61	349,283	3.3
Alberta.....	1,162,264	9.39	1,342,427	9.65	997,685	9.4
British Columbia.....	706,039	5.70	866,427	6.23	687,516	6.5
Canada.....	12,381,718	100.00	13,904,643	100.00	10,593,578	100.0

Table 326.—Value of Clay Products Produced in Canada from Domestic and from Imported Clays, 1929 and 1930

Product	From domestic clays		From imported clays		Total	
	1929	1930	1929	1930	1929	1930
	\$	\$	\$	\$	\$	\$
Fireclay blocks and shapes.....	130,411	147,309	362,360	298,945	492,771	446,254
Sanitary ware.....			*	*		
Ceramic or glazed floor and wall tile.....			*	*		
Pottery, glazed and unglazed.....	323,194	294,866	69,140	41,800	392,334	336,666
Electrical porcelain insulators.....			2,065,404	1,957,523	2,065,404	1,957,523
Other clay products (brick, tile, sewer pipe, etc.).....	13,451,038	10,151,403	876,134	679,875	14,327,172	10,831,278
Total.....	13,904,643	10,593,578	3,373,038	2,978,143	17,277,681	13,571,721

* Included with other clay products

Table 327.—Production in Canada, Imports and Exports of Clay and Clay Products, 1928–1930

Kind	1928		1929		1930	
	Quantity	Total selling value	Quantity	Total selling value	Quantity	Total selling value
		\$		\$		\$
PRODUCTION—						
Brick: Soft mud process { Face..... M	17,532	349,847	26,624	538,096	11,350	247,220
{ Common... M	93,280	1,328,981	77,399	1,185,511	56,487	861,805
Stiff mud process { Face..... M	101,717	2,247,472	114,093	2,469,417	99,284	2,135,871
{ Common... M	144,404	2,182,307	170,840	2,508,451	105,225	1,480,965
Dry press { Face..... M	36,587	748,301	38,591	813,461	29,434	604,197
{ Common... M	24,294	337,096	26,131	368,039	16,915	208,495
Fancy or ornamental brick (including special shapes, embossed and enamelled brick)..... M	599	28,763	187	12,795	339	27,649
Sewer brick..... M	2,888	59,010	4,765	96,588	804	15,299
Paving brick..... M	338	4,464	97	3,844	9	297
Firebrick from domestic clay M	4,940	234,460	5,196	251,043	3,789	177,608
Fireclay..... tons	5,123	35,284	5,041	35,226	2,870	25,975
Kaolin..... tons	5	25				
Bentonite..... tons	20	100			74	1,396
Fireclay blocks and shapes.....		105,091		130,411		147,309
Structural tile:—						
Hollow blocks (including fireproofing and load-bearing tile)..... tons	205,257	1,930,152	221,800	2,214,384	165,359	1,667,783
Roofing tile..... No.	72,930	6,435	35,075	4,628	3,056	356
Floor tile (quarries)..... Sq. ft.	171,520	45,729	307,400	70,186	179,786	56,230
Drain tile..... M	22,629	656,054	25,000	720,316	25,291	687,070
Sewer pipe (including copings, flue linings, etc.).....		1,723,644		2,005,887		1,721,815
Pottery, glazed or unglazed.....		356,093		323,194		294,866
Other products.....		2,410		142,166		231,372
Total.....		12,381,718		13,904,643		10,593,578
IMPORTS—						
Building brick..... M	14,513	246,723	15,678	291,370	11,707	255,515
Building blocks.....		58,016		222,947		131,569
Clays—						
China..... cwt.	462,357	262,207	497,571	292,980	462,245	278,757
Fire..... cwt.	1,219,155	266,320	1,521,282	322,508	1,147,387	240,293
Pipe.....		794		570		9,262
Zirconium silicate.....		2,450		8,223		6,092
Zirconium oxide.....				8,244		5,706
Other clays.....		93,663		150,604		155,650
Drain tile, unglazed.....		556		2,809		2,076
Drain sewer pipe and earthenware fittings therefor, chimney linings or vents chimney tops or inverted blocks, glazed or unglazed.....		103,506		119,654		73,872
Insulators, electric, porcelain.....		510,008		556,535		355,036
Earthenware and chinaware.....		5,418,017		6,257,954		5,313,858
Brick, fire, other, valued at not less than \$100 per M, rectangular shaped: the dimensions of each not to exceed 125 cubic inches for use exclusively in the construction or repair of a furnace, kiln, etc.....		38,327		93,513		64,042
Brick, fire, n.o.p., for use exclusively in the construction or repair of a furnace, kiln or other equipment of a manufacturing establishment.....		1,217,003		1,706,109		1,297,778
Firebrick, n.o.p.....		117,539		76,963		53,682
Firebrick, chrome.....		56,375		101,302		73,761
Magnesite brick.....		140,944		256,635		270,180
Silica brick.....		259,192		330,592		315,039
Paving brick..... M	3,431	88,943	5,173	120,871	4,522	108,357
Other clay manufactures.....		1,143,164		1,239,183		1,186,156
Total.....		10,023,747		12,159,566		10,196,681
EXPORTS—						
Building brick..... M	3,034	46,037	1,587	21,797	1,822	26,150
Clay—						
Unmanufactured..... cwt.	19,903	20,577	16,379	6,640	9,688	5,900
Manufactures.....		76,529		54,397		36,606
Earthenware.....		17,235		24,563		30,931
Porcelain insulators.....		124,140		268,109		349,533
Total.....		284,518		375,506		449,120

Table 329.—Production of Building Brick (Common and Pressed) in Canada, 1886-1923

Year	Common and Pressed*		Year	Common		Pressed		Total	
	Quantity	Value		Quantity	Value	Quantity	Value	Quantity	Value
	M	\$		M	\$	M	\$	M	\$
1886.....		873,600	1907.....	439,016	3,455,524	78,922	794,722	517,938	4,250,246
1887.....		986,689	1908.....	353,261	2,611,554	53,481	517,180	406,742	3,128,734
1888.....		1,036,746	1909.....	539,229	4,212,424	57,265	630,677	596,494	4,843,101
1889.....		1,273,884	1910.....	627,715	5,105,354	67,895	807,294	695,610	5,912,648
1890.....		1,266,982	1911.....	645,551	5,420,890	87,351	1,094,582	732,902	6,515,472
1891.....		1,061,536	1912.....	769,192	7,010,375	125,180	1,609,854	894,372	8,620,229
1892.....		1,251,934	1913.....	668,427	5,917,373	116,802	1,458,733	785,229	7,376,106
1893.....		1,800,000	1914.....	457,514	3,653,861	93,635	1,115,556	551,149	4,769,417
1894.....		1,800,000	1915.....	234,733	1,755,187	49,817	492,774	284,550	2,247,961
1895.....		1,670,000	1916.....	237,035	1,826,844	44,947	492,355	281,982	2,319,199
1896.....		1,600,000	1917.....	210,631	1,999,465	46,409	653,153	257,040	2,652,618
1897.....		1,600,000	1918.....	164,970	1,879,811	40,147	639,083	205,117	2,518,894
1898.....		1,900,000	1919.....	291,470	3,850,219	74,424	1,304,162	365,894	5,154,381
1899.....		2,195,000	1920.....	303,343	4,835,996	85,137	2,004,537	388,480	6,840,533
1900.....		2,275,000	1921.....	230,438	3,567,503	80,947	1,738,283	301,385	5,305,796
1901.....		2,400,000	1922.....	294,919	4,714,658	90,578	1,839,549	385,497	6,554,207
1902.....		2,593,000	1923.....	250,565	3,884,474	73,400	1,461,483	823,965	5,345,957
1903.....		2,832,000	Total.....						
1904.....		2,983,000							
1905.....	523,820	3,933,925							125,791,385
1906.....	523,890	4,102,590							

* Separate statistics not available till 1907.

Table 330.—Production of Building Brick in Canada, 1924-1930

	Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or ornamental brick	Sewer brick	Total
	Face	Common	Face	Common	Face	Common			
	M	\$	M	\$	M	\$			
1924.....	10,831	50,079	80,565	124,556	35,203	12,794	755	2,690	317,473
1925.....	185,248	746,044	1,842,224	1,880,631	761,572	168,043	98,460	40,775	5,722,997
1926.....	27,701	51,214	93,903	116,105	37,201	22,053	524	2,485	351,186
1927.....	521,739	753,970	1,883,856	1,635,257	800,504	270,135	26,320	52,382	5,944,163
1928.....	28,235	78,158	101,028	94,046	30,423	19,450	462	6,546	358,348
1929.....	556,573	1,145,490	2,146,362	1,624,055	651,236	260,598	24,057	117,194	6,525,565
1930.....	16,196	70,554	95,480	150,222	39,753	14,617	620	10,997	398,439
1931.....	325,966	1,091,274	2,024,064	2,239,180	833,570	187,062	29,372	210,643	6,941,131
1932.....	17,532	93,280	101,717	144,404	36,587	24,294	599	2,888	421,301
1933.....	349,847	1,328,981	2,247,472	2,182,307	748,301	337,096	28,763	59,010	7,251,777
1934.....	26,624	77,399	114,093	170,840	38,591	26,131	187	4,765	458,630
1935.....	538,096	1,195,511	2,469,417	2,509,451	813,461	368,039	12,795	96,588	8,003,358
1936.....	11,350	56,487	99,284	105,225	29,434	16,915	339	804	319,838
1937.....	247,220	861,805	2,135,871	1,480,965	604,197	208,495	27,649	15,299	5,581,501
Total.....	138,469	477,171	686,070	905,398	247,192	136,254	3,486	31,175	2,625,215
	2,724,689	7,123,075	14,749,266	13,551,846	5,212,841	1,799,468	247,416	591,891	46,000,492

Table 331.—Production of Paving Brick* in Canada, 1897-1930

Year	Quantity	Value	Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$		M	\$
1897.....	4,568	45,670	1907.....	3,618	72,354	1916.....	1,590	30,144
1898.....			1908.....	3,720	59,456	1917-1921.....		
1899.....	5,300	42,550	1909.....	3,760	67,408	1922.....	151	5,972
1900.....	2,710	26,950	1910.....	4,215	78,980	1923-1925.....		
1901.....	3,689	37,000	1911.....	5,220	79,444	1926.....	122	5,015
1902.....	4,211	42,000	1912.....	4,580	85,989	1927.....	50	2,103
1903.....	3,789	45,288	1913.....	4,208	75,669	1928.....	338	4,464
1904.....	4,436	55,450	1914.....	2,707	49,627	1929.....	97	3,844
1905.....	4,500	54,000	1915.....	1,228	20,694	1930.....	9	297
1906.....	3,000	45,000				Total.....	71,816	1,035,371

* Figures prior to 1907 compiled by the Ontario Bureau of Mines.

Table 332.—Production of Structural Tile in Canada, by Provinces, 1928-1930

Province	Hollow blocks (including fireproofing and load-bearing tile)		Roofing tile		Floor tile (quarries)	
	Tons	Value	No.	Value	Sq. ft.	Value
1928		\$		\$		\$
Nova Scotia.....	11,254	132,594				
Quebec.....	40,607	441,107			500	50
Ontario.....	112,887	983,005	72,930	6,435	171,020	45,679
Manitoba.....	2,100	25,710				
Saskatchewan.....	10,120	81,202				
Alberta.....	18,432	166,142				
British Columbia.....	9,857	100,392				
Canada.....	205,257	1,930,152	72,930	6,435	171,520	45,729
1929						
Nova Scotia.....	15,455	182,076				
New Brunswick.....	1,119	23,734				
Quebec.....	49,488	536,684				
Ontario.....	103,454	972,993	35,075	4,628	307,400	70,186
Manitoba.....	2,785	41,254				
Saskatchewan.....	13,257	111,072				
Alberta.....	20,812	195,503				
British Columbia.....	15,430	151,068				
Canada.....	221,800	2,214,394	35,075	4,628	307,400	70,186
1930						
Nova Scotia.....	9,378	107,998				
New Brunswick.....	600	8,888				
Quebec.....	39,769	484,605				
Ontario.....	85,155	791,474	3,056	356	179,047	56,054
Manitoba.....	1,335	17,754				
Saskatchewan.....	7,566	60,214			739	176
Alberta.....	13,123	111,807				
British Columbia.....	8,433	85,043				
Canada.....	165,359	1,667,783	3,056	356	179,786	56,230

Table 333.—Production of Sewer Pipe, Copings, Flue Linings, etc. in Canada, 1921-1930

(For the years 1888 to 1920 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....		1,666,584	1926.....	75,996	1,480,776
1922.....	75,932	1,766,347	1927.....	77,262	1,475,875
1923.....	70,252	1,616,324	1928.....		1,723,644
1924.....	76,355	1,594,280	1929.....		2,005,887
1925.....	73,791	1,440,269	1930.....		1,721,815

*Data not available.

Table 334.—Production of Drain Tile in Canada, 1921-1930

(For the years 1891 to 1920 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1921.....		473,952	1926.....	14,258	396,018
1922.....	14,728	407,386	1927.....	22,259	598,098
1923.....	10,599	323,314	1928.....	22,629	656,054
1924.....	15,137	409,369	1929.....	25,000	720,316
1925.....	14,552	401,503	1930.....	25,291	687,070

Table 335.—Production of Drain Tile and Sewer Pipe, in Canada, by Provinces, 1929 and 1930

Province	1929				1930			
	Drain tile		Sewer pipe		Drain tile		†Sewer pipe	
	M	\$	Tons	\$	M	\$	Tons	\$
Nova Scotia.....	131	5,284		225,128	111	3,796		239,475
New Brunswick.....					5	193		
Quebec.....	807	28,500		147,115	835	28,763		195,981
Ontario.....	22,535	629,322		1,167,463	22,783	593,980		834,361
Manitoba.....	392	15,565			310	15,024		
Saskatchewan.....	25	1,000			25	1,000		
Alberta.....	158	7,711		335,954	58	3,785		335,033
British Columbia.....	952	32,934		130,227	1,164	40,529		116,965
Canada.....	25,000	720,316		2,005,887	25,291	687,070		1,721,815

†Includes copings, flue linings, etc.

Table 336.—Production of Pottery from Domestic Clays in Canada, 1921-1930

(For the years 1888 to 1920 see Mineral Production of Canada, 1928)

Year	Value	Year	Value
	\$		\$
1921.....	231,263	1926.....	320,135
1922.....	266,391	1927.....	307,057
1923.....	229,547	1928.....	356,093
1924.....	238,342	1929.....	323,194
1925.....	267,255	1930.....	294,866

Table 337.—Production of Kaolin in Canada, 1912-1930

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1912.....	20	160	1918.....	863	19,299	1924-1926.....		
1913.....	500	5,000	1919.....	759	13,744	1927.....	24	120
1914.....	1,000	10,000	1920.....	683	15,022	1928.....	5	25
1915.....	1,500	13,000	1921.....	124	1,888	1929-1930.....		
1916.....	1,750	17,500	1922.....	1,197	17,866	Total.....	8,921	125,587
1917.....	533	9,594	1923.....	163	2,369			

The Ontario Department of Mines reports that china clay or kaolin occurs on the Mattagami river in Northern Ontario but has not yet been developed in an economic way.

Table 338.—Production of Fireclay in Canada, 1921-1930

(For years 1899 to 1920 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	Tons	\$		Tons	\$
1921.....	2,931	29,851	1926.....	2,513	23,258
1922.....	10,196	55,185	1927.....	5,070	35,961
1923.....	2,685	24,158	1928.....	5,123	35,284
1924.....	3,645	26,258	1929.....	5,041	35,226
1925.....	623	6,544	1930.....	2,870	25,975

Table 339.—Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1921-1930

(For the years 1907 to 1920 see Mineral Production of Canada, 1928)

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1921.....	4,502	242,462	91,685	1926.....	4,195	192,276	54,064
1922.....	6,705	251,776	65,588	1927.....	5,388	246,266	100,659
1923.....	6,122	295,037	81,345	1928.....	4,910	234,460	105,091
1924.....	4,327	209,256	51,273	1929.....	5,196	251,043	130,411
1925.....	6,197	305,332	36,567	1930.....	3,789	177,608	147,309

Table 340.—Production of Refractories, in Canada, from Domestic Clays, by Provinces, 1929 and 1930

Province	1929					1930				
	Fireclay		Firebrick		Fire-clay blocks and shapes	Fireclay		Firebrick		Fire-clay blocks and shapes
	Quantity	Value	Quantity	Value	Value	Quantity	Value	Quantity	Value	Value
	Tons	\$	M	\$	\$	Tons	\$	M	\$	\$
Nova Scotia.....	2,972	10,669	154	11,340	675	1,269	5,720			525
New Brunswick.....	47	1,863			1,351	46	1,814			552
Saskatchewan.....	754	5,965	808	43,384	106,643	504	3,920	504	28,001	118,122
Alberta.....	48	624	59	2,934		30	450	16	832	
British Columbia.....	1,220	16,105	4,175	193,385	21,742	1,021	14,071	3,269	148,775	28,110
Canada.....	5,041	35,226	5,196	251,043	130,411	2,870	25,975	3,789	177,608	147,309

Table 341.—World Production of China Clay.

(Supplied by Imperial Institute)

(Long tons)

Country	1928	1929	1930
BRITISH EMPIRE			
United Kingdom.....	787,296	826,046	716,319
Canada.....	4		
India.....	18,783	16,657	19,116
Unfederated Malay States.....	985	741	410
Australia.....	11,044	6,082	(a)
FOREIGN COUNTRIES			
Belgium (b).....	10,492	11,072	9,301
Bulgaria.....	2,693	3,615	5,656
Czechoslovakia (estimated).....	400,000	450,000	400,000
Denmark—			
Crude.....	30,600	21,341	29,406
Washed or pressed.....	9,100		
France.....	122,600	169,100	(a)
Germany—			
Bavaria.....	373,476	376,953	366,712
Prussia.....	14,005	15,984	12,844
Saxony—			
Crude.....	52,863	48,196	51,327
Washed.....	62,206	64,268	47,487
Italy.....	27,700	31,000	22,300
Portugal.....	4,147	3,818	4,601
Roumania (c).....	7,186	7,376	6,666
Russia (years ended Sept. 30).....	77,585	(a)	(a)
Spain (d).....	2,050	2,000	800
Algeria.....	2,500	1,344	2,523
United States (including paper-clay).....	442,984	462,651	455,673
Argentina.....			369
China (estimated).....	300,000	300,000	300,000
Japan—			
Porcelain stones and earth.....	373,398	(a)	(a)
Clay for paper manufacture.....	38,573	(a)	(a)
Korea.....	5,714	8,586	8,134
Southern Manchuria (estimated).....	23,000	23,000	23,000

(a) Information not available.

(b) Including "Eurite".

(c) Converted from cubic metres at the rate of 1 cu. metre=2 long tons.

(d) In addition kaolinic sand was produced as follows (converted at rate of 1 cu. metre=2 long tons):—

1928—19,050 long tons.

1929—6,700 long tons.

1930—4,200 long tons.

Table 342.—Plants Reporting Shipments in the Clay Products Industry in Canada, by Provinces, 1930

Province	Number of plants in groups indicated					Total
	Brick and tile	Clay sewer pipe	Firebrick and fireclay products	Stoneware and pottery	Kaolin and other clays	
Nova Scotia.....	6	1			1	8
New Brunswick.....	4			1		5
Quebec.....	16	1	1			18
Ontario.....	131	3	1	2		137
Manitoba.....	5					5
Saskatchewan.....	5					5
Alberta.....	8		1	1		10
British Columbia.....	13		1	1		15
Canada.....	188	5	4	5	1	203

Table 343.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1929 and 1930

Industry and Province	1929				1930			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
By INDUSTRIES—								
<i>Brick and Tile—</i>								
* Nova Scotia.....	475,368	79,037	95,707	650,112	756,432	150,587	67,630	974,649
New Brunswick.....					209,196	36,156	26,271	271,623
Quebec.....	9,911,417	920,863	610,720	11,443,000	9,597,458	1,070,198	759,525	11,427,181
Ontario.....	8,514,966	1,215,806	1,265,272	10,996,044	10,448,974	1,831,769	2,078,029	14,358,772
Manitoba.....	274,108	74,989	105,050	454,147	247,575	67,953	134,591	450,119
Saskatchewan.....	895,884	72,424	134,132	1,102,440	926,098	110,148	105,305	1,141,551
Alberta.....	1,177,984	145,583	175,412	1,498,979	1,835,128	272,723	548,786	2,656,637
British Columbia.....	1,022,296	175,406	161,264	1,358,966	1,153,770	196,502	127,122	1,477,394
Total for Canada.....	22,272,023	2,684,108	2,547,557	27,503,688	25,174,631	3,736,036	3,847,259	32,757,926
<i>† Clay sewer pipe—</i>								
Total for Canada.....	2,825,250	599,821	260,645	3,694,716				
<i>† Firebrick and fireclay products—</i>								
Total for Canada.....	1,418,530	182,460	604,508	2,295,498				
<i>† Kaolin and other clays—</i>								
Total for Canada.....								
<i>Stoneware and pottery—</i>								
Total for Canada.....	540,755	93,883	61,516	696,154	497,423	100,333	75,095	672,851
By PROVINCES—								
<i>Total for clay and clay products—</i>								
Nova Scotia.....	791,818	149,547	84,692	1,026,057	756,432	150,587	67,630	974,649
New Brunswick.....	210,039	26,547	21,519	258,105	234,196	36,156	26,271	296,623
Quebec.....	10,512,410	1,067,893	895,997	12,476,300	9,597,458	1,070,198	759,525	11,427,181
Ontario.....	11,068,103	1,687,749	1,565,464	14,321,316	10,520,257	1,839,669	2,126,682	14,486,608
Manitoba.....	274,108	74,989	105,050	454,147	247,575	67,953	134,591	450,119
Saskatchewan.....	895,884	72,424	134,132	1,102,440	926,098	110,148	105,305	1,141,551
Alberta.....	2,249,900	299,277	599,579	3,148,756	2,236,268	365,156	575,228	3,176,652
British Columbia.....	1,054,296	181,846	166,793	1,402,935	1,153,770	196,502	127,122	1,477,394
Canada.....	27,056,558	3,560,272	3,573,226	34,190,056	25,672,054	3,836,369	3,922,354	33,430,777

*Includes 2 firms in New Brunswick in 1929.

†Included with brick and tile in 1930.

Table 344.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1929				\$	\$	\$
Nova Scotia.....	18	245	263	30,953	198,434	229,387
New Brunswick.....	8	89	97	9,965	58,962	68,927
Quebec.....	91	1,168	1,259	195,371	1,057,432	1,252,803
Ontario.....	216	2,442	2,658	518,533	2,283,363	2,801,896
Manitoba.....	12	198	210	27,350	152,931	180,281
Saskatchewan.....	19	164	183	40,180	161,188	201,368
Alberta.....	26	443	469	67,505	485,057	552,562
British Columbia.....	25	366	391	51,588	388,202	439,790
Canada.....	415	5,115	5,530	941,445	4,785,569	5,727,014
1930						
Nova Scotia.....	12	218	230	29,900	161,752	191,652
New Brunswick.....	7	106	113	12,852	66,743	79,595
Quebec.....	78	992	1,070	193,278	860,927	1,054,205
Ontario.....	212	2,133	2,345	481,392	1,873,798	2,355,190
Manitoba.....	14	226	240	28,220	112,539	140,759
Saskatchewan.....	21	166	187	41,853	137,361	179,214
Alberta.....	31	403	434	87,060	435,140	522,200
British Columbia.....	24	383	407	47,944	390,351	438,295
Canada.....	399	4,627	5,026	922,499	4,038,631	4,961,130

*See note page 37.

Table 345.—Wage-Earners in the Clay Products Industry in Canada, by Months and by Industries, 1930

Month	Brick, tile, sewer pipe, firebrick, fireclay products, kaolin and all other clays	Stoneware and pottery	Total
January.....	2,449	153	2,602
February.....	2,250	161	2,411
March.....	2,600	151	2,751
April.....	3,533	137	3,670
May.....	4,468	162	4,630
June.....	4,922	177	5,099
July.....	4,982	184	5,166
August.....	4,678	117	4,795
September.....	4,236	113	4,349
October.....	3,506	145	3,651
November.....	3,031	134	3,165
December.....	2,515	125	2,640

IMPORTED CLAY PRODUCTS

In continuance of the custom followed in previous mineral production reports, a short review of the imported-clay products industry is given herewith.

Manufactures in Canada from imported clays in 1930 amounted in value to \$2,978,143, of this amount the province of Quebec contributed \$679,278 and Ontario, \$2,298,865. This production was 12 per cent under the record of \$3,373,038 established for the industry in 1929. Each year from 1926 until 1929 the industry attained a new high production value, the annual rate of increase amounting to 2 per cent in 1927, 18 per cent in 1928, and 37 per cent in 1929. Among the products manufactured from imported clays were porcelain insulators valued at \$1,957,523; firebrick stove linings and refractories of a similar nature, \$298,945; and other miscellaneous manufactures as pottery, sanitary earthenware, sewer pipe, floor tile, etc.

Data on this industry for 1930 covers the operation of 15 plants, 11 of which were located in the province of Ontario and 4 in Quebec. These concerns employed a working capital of \$4,099,965, afforded monthly employment to an average of 841 persons who received \$1,052,286 in salaries and wages. Purchased materials cost \$834,181 and the value added by manufacturing processes was \$2,143,962.

At St. Johns, Quebec, two plants produced sanitary ware from imported ball and china clays, while a third firm manufactured refractory products and vitrified sewer pipe. Refractory products were also made by one firm at Montreal, two at Toronto, one at Mimico, one at Port Robinson and one at Hamilton. Earthenware was produced at Hamilton, Ontario. Porcelain insulators were manufactured in Ontario at Georgetown, Hamilton, Niagara Falls and Peterborough. Artware was produced at Oshawa and a plant at Kingston produced ceramic floor tile.

Table 346.—Capital Employed in the Imported-Clay Products Industry in Canada, 1929 and 1930

	1929	1928
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Cost of lands, buildings, machinery and tools.....	1,852,882	2,573,608
Cost of supplies and stocks on hand.....	621,365	655,241
Cash, trading and operating accounts and bills receivable.....	997,805	871,116
Total.....	3,472,052	4,099,965

Table 347.—Employees, Salaries and Wages in the Imported-Clay Products Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees					Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Male	Female				
1929						\$	\$	\$
Quebec.....	22	4	249	6	281	62,038	305,351	367,389
Ontario.....	45	20	449	77	591	188,797	556,695	745,492
Canada.....	67	24	698	83	872	250,835	862,046	1,112,881
1930								
Quebec.....	27	3	219	6	255	67,024	257,933	324,957
Ontario.....	43	21	449	73	586	180,538	546,791	727,329
Canada.....	70	24	668	79	841	247,562	804,724	1,052,286

* See note page 37.

Table 348.—Wage-Earners in the Imported-Clay Products Industry in Canada, by Months, 1929 and 1930

Month	Number		Month	Number	
	1929	1930		1929	1930
January.....	713	739	July.....	806	759
February.....	737	745	August.....	817	757
March.....	745	733	September.....	816	741
April.....	760	740	October.....	911	749
May.....	779	758	November.....	798	737
June.....	778	751	December.....	786	735

LIME

Statistics obtained during the census of 1871 show 1,010 lime kilns in operation in Canada. These kilns were located in Nova Scotia, New Brunswick, Quebec and Ontario. Capital invested in plant and equipment as recorded during that year was \$128,508, and employees numbered 2,042, earning \$157,943; the value of lime produced was \$502,156. A substantial growth was shown in this industry according to data obtained ten years later; active kilns had increased to 1,274 with a corresponding advance in capital investment to a total of \$309,354. Employment in 1881 was furnished 2,537 wage-earners who received \$203,631 and the value of lime produced was \$707,132.

Lime production in Canada during 1930 amounted to 490,802 tons valued at \$4,038,698. These figures represent decreases of 27·2 per cent in quantity and 31·6 per cent in value from the 1929 production of 674,087 tons worth \$5,908,610. Canadian producers received an average of \$11.30 per ton for hydrated lime and \$7.68 per ton for quicklime.

Lime used in chemical or metallurgical processes employed in the pulp and paper, mining, steel and other industries, amounted to 351,443 tons or 71·6 per cent of the total lime production. Of this tonnage the pulp and paper industry consumed 91,624 tons valued at \$694,984.

More than half the quantity of lime produced in Canada during 1930 came from the province of Ontario and over 26 per cent was produced in Quebec. In the order named the following provinces produced the remainder; British Columbia, Nova Scotia, Manitoba, New Brunswick and Alberta.

Table 349.—Production of Lime in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928. Reported in bushels, 1 bushel=70 lb.)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	240,767	2,781,197	1926.....	413,901	3,781,484
1922.....	314,054	3,165,005	1927.....	444,753	3,923,388
1923.....	351,236	3,266,608	1928.....	508,889	4,534,568
1924.....	319,793	3,178,541	1929.....	674,087	5,908,610
1925.....	358,979	3,387,652	1930.....	490,802	4,038,698

Table 350.—Production of Lime in Canada, 1929, Showing Purposes for Which Sold or Used

Purposes for which sold or used	1929			
	Quicklime		Hydrated lime	
	Bushels	Value	Tons	Value
		\$		\$
Building trades.....	45,904	469,742	53,025	694,669
Chemical works.....	297,855	2,397,989	509	5,799
Glass works.....	8,509	70,695	500	6,240
Smelters.....	48,689	209,861		
Pulp and paper mills.....	97,071	691,849	6,100	56,754
Sugar refineries.....	8,279	70,707		
Tanneries.....	1,963	16,398	110	1,171
Agricultural uses (fertilizer).....	365	2,440	2,396	21,274
Dealers (uses unspecified).....	44,651	433,883	17,951	261,066
Other consumers.....	27,297	344,595	12,913	153,478
Total sold or used.....	580,583	4,708,159	93,504	1,200,451

Table 351.—Production of Lime in Canada, 1930, Showing Purposes for Which Sold or Used

Purposes for which sold or used	1930			
	Quicklime		Hydrated lime	
	Tons	Value	Tons	Value
		\$		\$
Building Trades—				
Finishing lime.....	13,319	145,073	38,198	506,301
Masons' lime.....	25,773	235,421	11,283	114,750
Sand-lime brick.....	11,543	89,888		
Agricultural.....	250	2,750	1,249	10,921
Chemical—				
Smelters.....	2,177	13,467	3,676	27,588
Iron and steel mills.....	33,215	135,766	245	2,573
Cyanide mills.....	13,217	107,955		
Pulp and paper mills.....	82,402	611,805	9,222	83,179
Glass works.....	4,033	32,911		
Sugar refineries.....	9,826	75,634	16	200
Tanneries.....	1,952	16,757	131	1,049
Other chemical works.....	188,515	1,460,871	2,816	26,357
Dealers (uses unspecified).....	19,041	189,832	5,419	47,055
Other consumers.....	11,658	85,009	6,126	15,856
Total.....	416,921	3,203,139	73,881	835,559

Table 352.—Production of Lime in Canada, by Provinces, 1928-1930

Province		Quicklime		Hydrated Lime		Total	
		Sold or used		Sold or used		Sold or used	
		Tons	Value	Tons	Value	Tons	Value
			\$		\$		\$
Nova Scotia.....	1928	35,534	167,386	620	8,490	36,154	175,876
	1929	41,001	143,787	1,000	10,400	42,001	154,187
	1930	30,462	106,730	652	6,520	31,114	113,250
New Brunswick.....	1928	11,236	130,484	25	300	11,261	130,784
	1929	11,766	135,981	3,752	38,572	15,518	174,553
	1930	9,947	104,159	2,574	31,145	12,521	135,304
Quebec.....	1928	102,859	795,999	11,271	100,783	114,130	896,782
	1929	157,414	1,183,148	9,478	81,046	166,892	1,264,194
	1930	117,358	874,077	11,922	93,573	129,350	967,650
Ontario.....	1928	228,101	1,870,476	49,085	597,367	277,186	2,467,843
	1929	314,243	2,624,284	55,915	740,127	370,158	3,364,411
	1930	209,340	1,673,409	42,720	504,178	252,060	2,177,587
Manitoba.....	1928	20,006	173,127	8,331	146,572	28,337	319,699
	1929	22,178	186,377	10,068	174,727	32,246	361,104
	1930	17,587	143,955	6,511	116,370	24,098	269,325
Alberta.....	1928	6,672	69,588			6,672	69,588
	1929	7,681	79,569			7,681	79,569
	1930	5,123	49,330	13	195	5,136	49,525
British Columbia.....	1928	24,512	345,131	10,637	128,865	35,149	473,996
	1929	28,300	355,013	13,291	155,579	39,591	510,592
	1930	27,104	251,479	9,413	83,578	36,517	335,057
Canada.....	1928	428,920	3,552,191	79,969	982,377	508,889	4,534,568
	1929	589,583	4,708,159	93,504	1,200,451	674,087	5,908,610
	1930	416,921	3,203,139	73,881	835,559	490,802	4,038,698

Table 353.—Imports into Canada and Exports of Lime, 1928-1930

Item	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Imports.....	5,417	64,811	4,448	49,395	2,096	28,107
Exports.....	20,043	357,085	24,238	428,209	22,364	444,728

Table 354.—Capital Employed in the Lime Industry in Canada, by Provinces, 1929 and 1930

Province	1929				1930			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
New Brunswick*.....	170,015	30,444	34,797	235,256	137,000	30,831	27,500	195,331
Quebec.....	1,612,404	174,574	225,445	2,012,423	1,535,263	167,353	231,132	1,933,748
Ontario.....	2,466,818	230,258	113,708	2,810,784	3,097,960	146,006	951,706	4,195,672
Manitoba.....	548,563	44,002	3,043	595,608	619,231	52,864	1,183	673,278
Alberta.....	152,254	33,213	29,676	215,143	155,909	28,206	33,131	217,246
British Columbia.....	1,375,029	70,358	90,076	1,535,463	1,442,562	69,070	89,972	1,601,604
Canada.....	6,325,083	582,849	496,745	7,404,677	6,987,925	494,330	1,334,624	8,816,879

* Includes data for 2 firms in Nova Scotia.

Table 355.—Employees, Salaries and Wages in the Lime Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1929				\$	\$	\$
New Brunswick†.....	10	128	138	16,740	107,512	124,252
Quebec.....	13	394	407	19,357	362,162	381,519
Ontario.....	53	410	463	67,352	427,234	494,586
Manitoba.....	9	137	146	13,579	98,572	112,151
Alberta.....	4	29	33	5,500	35,604	41,104
British Columbia.....	20	175	195	36,076	203,404	239,480
Canada.....	109	1,273	1,382	158,604	1,234,488	1,393,092
1930						
New Brunswick†.....	8	100	108	11,272	87,367	98,639
Quebec.....	18	284	302	32,238	226,919	259,157
Ontario.....	36	341	377	56,067	357,847	413,914
Manitoba.....	8	110	118	13,079	75,850	88,929
Alberta.....	3	21	24	5,500	27,190	32,690
British Columbia.....	18	139	157	30,369	164,080	194,449
Canada.....	91	995	1,086	148,525	939,253	1,087,778

* See note page 37.

† Includes data for 2 firms in Nova Scotia.

Table 356.—Wage-Earners in the Lime Industry in Canada, by Provinces and by Months, 1930

Month	New* Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
January.....	102	254	289	117	9	137	908
February.....	83	235	296	104	21	138	877
March.....	87	202	314	108	25	147	883
April.....	100	286	321	110	28	146	991
May.....	107	313	365	114	27	144	1,070
June.....	109	318	373	122	25	132	1,079
July.....	96	331	351	124	23	130	1,055
August.....	98	322	332	115	23	134	1,024
September.....	94	298	262	103	22	129	908
October.....	93	275	290	93	22	147	920
November.....	87	217	276	89	16	143	828
December.....	82	157	262	87	12	120	730

* Includes data for 2 firms in Nova Scotia.

SAND AND GRAVEL

Production statistics for the sand and gravel industry in Canada were first collected in 1912. Prior to that year the only data available consist of Customs' records of sand and gravel exported. In 1886 exportations amounted to 124,865 tons; twenty-four years later exports had risen to 624,824 tons appraised at \$407,974. During 1912, production was valued at \$1,512,099 and wages paid to the 875 pit employees totalled \$527,425. It was not until 1916 that tonnage statements were obtained from the operators in this industry; the total for that year amounted to 8,156,207 tons at \$1,838,320. Since 1918, the annual production has exceeded the 10-million ton mark. The highest market valuation per ton for this material was received in 1920, when 11,530,795 tons were sold for \$4,201,067. During that year, the 186 producers employed 1,546 men whose total earnings were \$1,343,212.

Sand and gravel production in Canada during 1930 amounted to 28,547,511 tons valued at \$8,344,913 as compared with 27,846,945 tons worth \$7,317,814 in 1929. This output constitutes a high record in both the quantity and value of sand and gravel produced in Canada.

Highway construction and hydro power developments contributed considerably to the increase in the consumption of sand and gravel in 1930.

Imports of sand and gravel into Canada during the year totalled 185,362 tons valued at \$167,642. Silica sand imported for glass and carborundum manufacture and for use in steel foundries amounted to 164,349 tons worth \$352,796. These imports included 134,812 tons from the United States, 29,469 tons from Belgium and smaller quantities from other countries.

During the field season of 1929 investigations were made by the Department of Mines, Ottawa, on the character of the gravels in the province of Quebec with a view to determining their suitability for road construction. Work of a similar nature has also been conducted in Prince Edward Island. In the latter province conglomerate and gravel are the only local primary materials which may be used with any degree of success in road surfacing.

Table 357.—Production of Sand and Gravel in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	11,574,862	2,537,249	1926.....	17,112,798	4,941,434
1922.....	11,666,374	3,502,935	1927.....	22,952,819	6,055,601
1923.....	12,752,515	3,016,518	1928.....	28,102,917	5,809,431
1924.....	11,603,500	3,181,083	1929.....	27,846,945	7,317,814
1925.....	11,018,647	3,220,410	1930.....	28,547,511	8,344,913

Table 358.—Production in Canada, Imports and Exports of Sand and Gravel, 1928-1930

Kind	1928		1929			1930		
	Tons	Value	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value
		\$	Tons	Tons	\$	Tons	Tons	\$
PRODUCTION—								
Sand—								
Moulding sand.....	42,060	46,404	7,659	56,798	50,308	202	43,440	31,768
Building sand and sand for concrete, roadwork, etc.....	2,380,366	829,659	2,207,745	501,544	1,181,261	3,036,318	406,867	1,399,044
Filter sand.....	4,500	18,000						
Core sand*			3,000	8,015	10,168		3,968	5,090
Other sand (including blast and engine sands).....	111,326	31,724		324,235	63,097		69,484	16,162
Sand and Gravel—								
Sand and gravel for railway ballast.....	11,981,398	1,198,360	23,041	11,175,050	1,257,424	192,903	6,559,517	961,462
Sand and gravel for concrete, roads, etc.....	12,530,310	3,061,139	3,247,771	9,307,323	4,087,132	4,892,140	12,517,450	5,569,202
Filter gravel.....	4,000	16,000						
Crushed gravel.....	1,048,957	608,145	785,618	199,146	668,424	452,785	372,437	362,185
Total.....	28,102,917	5,809,431	6,274,834	21,572,111	7,317,814	8,574,348	19,973,163	8,344,913
IMPORTS—					\$			\$
Sand, silica for glass and carborundum manufacture, etc.....	154,384	332,338	233,967	490,558		164,349	352,796	
Sand and gravel, n.o.p.....	588,211	275,322	269,426	216,918		185,862	167,642	
Total.....	742,595	607,660	503,393	707,476		349,711	520,438	
EXPORTS.....	797,111	232,422	1,903,312	441,798		2,586,461	465,292	

* Included with other sand in 1928.

Table 359.—Production of Sand and Gravel in Canada, by Railway Operators, 1928-1930

Kind	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Sand—						
Moulding sand.....			425	225		
Building sand and sand for concrete, roads, etc.....	71,701	12,477	7,817	3,082	2,649	233
Other sand (including blast, core and engine sands).....	95,100	15,896	301,653	50,562	58,056	8,396
Sand and Gravel—						
Sand and gravel for railway ballast.....	11,957,131	1,195,710	10,534,345	1,236,364	6,133,237	807,174
Sand and gravel for concrete, roads, etc....	1,473,022	160,567	664,773	68,161	1,268,427	197,782
Crushed gravel.....					252,176	20,431
Total.....	13,596,954	1,384,650	11,509,013	1,358,394	7,714,545	1,034,016

Table 360.—Production of Sand and Gravel in Canada, by Operators Other than Railways, 1928-1930

Kind	1928		1929			1930		
	Tons	Value	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
		\$	Tons	Tons	\$	Tons	Tons	\$
Sand—								
Moulding sand.....	42,060	46,404	7,659	56,373	50,083	202	43,440	31,768
Building sand and sand for concrete, roads, etc.....	2,308,665	817,182	2,207,745	493,727	1,178,179	3,036,318	404,218	1,398,811
Filter sand.....	4,500	18,000						
Core sand*.....			3,000	8,015	10,168		3,968	5,090
Other sand (including blast, and engine sands).....	16,226	15,828		22,582	12,535		11,428	7,766
Sand and Gravel—								
Sand and gravel for railway ballast.....	24,267	2,650	23,041	640,705	21,060	192,903	426,280	154,288
Sand and gravel for concrete, roads, etc.....	11,037,288	2,900,572	3,247,771	8,642,550	4,018,971	4,892,140	11,249,023	5,371,420
Filter gravel.....	4,000	16,000						
Crushed gravel.....	1,048,957	608,145	785,618	199,146	668,424	452,785	120,261	341,754
Total.....	14,505,963	4,424,781	6,274,834	10,063,098	5,959,420	8,571,348	12,258,618	7,310,897

* Included with other sand in 1928.

Table 361.—Production of Sand and Gravel in Canada, by Provinces, 1928-1930

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
1928								
Sand—								
Moulding sand.....tons	30			41,505	162			363
Building sand and sand for concrete, roads, etc.....tons	75			44,241	120			1,968
Filter sand.....tons	305	1,323	1,119,304	1,063,231	56,788	4,085	21,369	113,961
Other sand (including blast, core and engine sands).....tons	35	132	354,036	410,262	23,397	872	9,286	31,639
Crushed gravel.....tons			4,500					
Crushed gravel.....tons			18,000					
Other sand (including blast, core and engine sands).....tons	2,657	2,807		15,802	49,776	21,654	8,343	10,287
Crushed gravel.....tons	2,391	1,400		13,448	7,638	3,524	813	2,510
Sand and Gravel—								
Sand and gravel for railway ballast.....tons	85,749	451,766	2,337,895	2,931,604	1,272,009	1,601,486	1,875,077	1,425,812
Sand and gravel for concrete, roads, etc.....tons	13,156	44,468	178,594	247,339	154,260	196,054	185,049	179,440
Filter gravel.....tons	18,525	24,223	4,662,133	5,664,392	231,760	537,549	639,671	752,057
Crushed gravel.....tons	11,446	6,782	1,123,300	1,115,246	60,665	186,025	261,703	295,972
Crushed gravel.....tons			4,000					
Crushed gravel.....tons			16,000					
Crushed gravel.....tons	189,000	11,352	8,509	672,874	43,434	60,750	31,248	31,790
Crushed gravel.....tons	84,000	1,401	11,352	399,771	15,926	45,000	32,555	18,140
Total.....tons	296,266	491,471	8,136,341	10,389,498	1,653,929	2,225,524	2,575,708	2,334,270
Total.....tons	111,103	54,183	1,701,282	2,230,307	262,006	431,475	489,496	529,669
1929								
Sand—								
Moulding sand.....tons	60		170	62,738	1,028			461
Building sand and sand for concrete, roadwork, etc.....tons	150		106	48,047	895			1,110
Core sand.....tons	102		1,084,178	1,454,023	60,499	3,244	36,902	70,341
Other sand (including blast sand, engine sand, etc.).....tons	169		419,798	703,067	23,538	1,350	16,154	17,185
Crushed gravel.....tons	3,176		7,362	7,362	477			
Crushed gravel.....tons	2,858		6,826	6,826	484			
Other sand (including blast sand, engine sand, etc.).....tons		1,634	25,444	23,694	155,953	1,175	6,851	109,484
Crushed gravel.....tons		574	8,152	8,308	24,771	279	1,290	19,723
Sand and Gravel—								
Sand and gravel for railway ballast.....tons	221,887	498,451	1,146,095	2,785,954	1,278,089	2,642,881	1,097,037	1,527,697
Sand and gravel for concrete, roads etc.....tons	31,235	32,478	226,396	281,806	180,287	293,730	91,349	120,143
Crushed gravel.....tons	68,557	19,271	3,932,494	6,353,889	163,151	795,379	550,257	672,096
Crushed gravel.....tons	70,729	12,313	872,822	1,968,918	36,027	352,287	299,948	474,088
Crushed gravel.....tons	38,817	6,501	14,850	670,908	122,888	54,000	30,883	45,917
Crushed gravel.....tons	46,227	802	7,425	445,407	56,428	40,000	39,252	32,883
Total.....tons	332,599	525,857	6,203,231	11,358,568	1,782,085	3,496,679	1,721,930	2,425,996
Total.....tons	151,368	46,167	1,534,699	3,462,379	322,430	687,646	447,993	665,132
1930								
Sand—								
Moulding sand.....tons	30	9,450		32,551	700			911
Building sand and sand for concrete, roadwork, etc.....tons	75	7,000		22,845	1,083			765
Core sand.....tons	27		1,337,072	1,922,749	29,182	2,700	15,560	135,895
Other sand (including blast, core and engine sands).....tons	14		474,263	842,771	10,465	1,200	6,496	63,835
Crushed gravel.....tons				3,846	122			
Crushed gravel.....tons				5,000	90			
Other sand (including blast, core and engine sands).....tons	3,849	803	3,375	36,689	1,323	13,892		9,553
Crushed gravel.....tons	3,464	227	694	6,146	196	2,100		3,335
Sand and Gravel—								
Sand and gravel for railway ballast.....tons	191,943	328,881	855,597	1,729,855	64,708	2,309,412	908,523	363,501
Sand and gravel for concrete, roads, etc.....tons	33,594	31,319	187,161	201,512	13,758	306,647	149,644	37,827
Crushed gravel.....tons	329,834	18,417	4,317,408	7,755,385	1,033,351	1,293,799	702,906	1,958,490
Crushed gravel.....tons	273,260	2,757	1,083,008	2,469,117	361,116	405,832	277,081	697,031
Crushed gravel.....tons			68,355	546,007	123,717	60,750		26,393
Crushed gravel.....tons			5,564	236,439	67,236	36,000		16,946
Total.....tons	525,683	357,551	6,581,807	12,027,082	1,253,103	3,680,553	1,626,989	2,494,743
Total.....tons	310,407	41,303	1,750,690	3,783,830	453,944	751,779	433,221	519,739

Table 362.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1929 and 1930

Province	1929				1930			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Quebec.....	993,003	41,362	125,777	1,160,142	370,622	19,750	8,758	399,130
Ontario.....	5,884,519	141,585	372,473	6,398,567	4,705,260	69,799	283,377	5,058,436
Manitoba.....	355,566	34,182	164,268	554,016	591,750	57,571	169,785	819,106
Saskatchewan.....	80,000	3,000	.....	83,000	75,000	2,500	.....	77,500
Alberta.....	325,000	4,800	2,000	331,800	.....	.....	.....	.....
British Columbia.....	577,344	10,296	38,870	626,510	1,130,422	15,561	50,062	1,196,045
Canada.....	8,215,432	235,235	703,388	9,154,055	6,873,054	165,181	511,982	7,550,217

Table 363.—Employees, Salaries and Wages in the Sand and Gravel Industry by Provinces, 1929 and 1930

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1929				\$	\$	\$
Nova Scotia.....	.....	167	167	.....	54,863	54,863
New Brunswick.....	.....	74	74	.....	15,160	15,160
Quebec.....	18	5,792	5,800	22,203	743,148	765,351
Ontario.....	60	1,065	1,125	113,451	826,491	939,942
Manitoba.....	8	275	283	16,785	112,558	129,343
Saskatchewan.....	4	550	554	8,000	185,031	193,031
Alberta.....	2	366	368	2,800	148,579	151,379
British Columbia.....	11	376	387	26,595	229,561	256,156
Canada.....	103	8,655	8,758	189,834	2,315,391	2,505,225
1930						
Nova Scotia.....	.....	285	285	.....	65,559	65,559
New Brunswick.....	.....	105	105	.....	14,063	14,063
Quebec.....	16	2,866	2,882	22,337	907,649	929,986
Ontario.....	50	911	961	103,404	671,656	775,060
Manitoba.....	10	290	300	21,511	142,928	164,439
Saskatchewan.....	4	477	481	7,500	185,601	193,101
Alberta.....	.....	309	309	.....	66,099	66,099
British Columbia.....	20	258	278	40,882	258,848	299,730
Canada.....	100	5,501	5,601	195,634	2,312,403	2,508,037

* See note page 37.

Table 364.—Wage-Earners in the Sand and Gravel Industry in Canada, by Months and by Provinces, 1930

Month	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
January.....	.....	1	96	165	7	2	3	105	379
February.....	.....	1	86	177	7	4	3	97	375
March.....	5	1	97	225	7	4	3	173	515
April.....	13	1	178	564	42	80	82	228	1,188
May.....	203	62	2,602	712	255	240	149	222	4,445
June.....	222	60	2,644	773	262	214	73	322	4,570
July.....	169	33	2,655	835	263	220	73	317	4,565
August.....	166	12	2,719	909	222	242	36	208	4,514
September.....	13	28	2,557	720	290	140	64	246	4,058
October.....	27	4	2,488	634	66	166	94	176	3,655
November.....	7	1	2,485	277	33	54	64	147	3,068
December.....	4	1	211	142	8	37	33	126	562

SAND-LIME BRICK

On account of its association with other building materials, data regarding the production of sand-lime brick are included in this report. Statistics relating to sand-lime brick are not included in the totals for structural materials industries as both the sand and lime used have been so recorded; production of sand-lime brick is regarded as a manufacturing operation and therefore is shown in the report on the *Manufactures of the Non-Metallic Minerals*, issued annually by the Bureau.

Production from the sand-lime brick industry in Canada was valued at \$671,301 in 1930. This was 30 per cent below the corresponding figure for 1929 and was the lowest output value for the industry since 1926 when the total was \$629,672. Products included sand-lime brick and ready-mixed mortar and plaster. For sand-lime brick alone the output in 1930 was 52,770 M valued at \$567,022 as compared with 78,361 M at \$953,726 in 1929.

A total of 11 plants manufactured sand-lime brick in Canada during 1930; of these, 6 were located in Ontario, 2 in Quebec, 2 in Manitoba, and 1 in British Columbia. This industry employed a capital of \$2,165,362 and paid out \$265,094 in salaries and wages to a monthly average of 225 employees. Materials purchased for manufacturing cost \$215,921 at the plants and the value added by manufacturing was \$455,380.

Conditions in the sand-lime brick industry follow closely the trend in building activity. For residential buildings, construction reached a peak value of \$139,000,000 in 1928, then declined 8 per cent the following year and 27 per cent in 1930 when it registered \$93,000,000. The total building permits for the construction of both residential and business properties, including private dwellings, apartment houses, churches, garages, hospitals, warehouses, etc., established a high record in 1929 of \$319,000,000 from which there was a decline of 24 per cent in 1930.

Table 365.—Sand-Lime Brick Manufactured in Canada, by Provinces, 1928-1930

Province	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
	M	\$	M	\$	M	\$
Quebec.....	14,122	203,249	8,745	114,617	9,025	111,930
Ontario.....	61,506	745,719	60,400	708,584	41,576	424,178
Manitoba.....	6,643	89,542	7,150	99,527	1,720	23,730
Alberta.....			2,066	30,998	449	7,184
Total.....	82,271	1,038,510	78,361	953,726	52,770	567,022

SLATE

Slate deposits located along the south shore of the St. Lawrence river in Quebec, were operated for the first time in 1854. Production from these deposits reached a maximum in point of value in 1889 when 6,935 tons valued at \$119,160 were shipped. These shipments consisted of roofing slates, mantels and slabs. Quarrying operations were carried on at the Quebec deposits up to 1923, in which year 1,836 tons of crushed green and red slate were shipped for use in the manufacture of roofing material. No production from these deposits has been recorded since that date.

During 1908, a slate quarry was operated at Jarvis Inlet, British Columbia and in 1930 a quarry at Leechtown, Victoria Mining Division, British Columbia, shipped 150 tons of slate to companies manufacturing or selling roofing materials.

Table 366.—Production of Slate in Canada, 1886-1930

Year	Tons*	Value	Year	Tons*	Value	Year	Tons*	Value
		\$			\$			\$
1886.....	5,345	64,675	1899.....		33,406	1912.....	1,894	8,939
1887.....	7,357	89,000	1900.....		12,100	1913.....	1,432	6,444
1888.....	5,314	90,689	1901.....	715	9,980	1914.....	1,075	4,837
1889.....	6,935	119,160	1902.....		19,200	1915.....	397	2,039
1890.....	6,368	100,250	1903*	5,510	22,040	1916.....	1,262	6,223
1891.....	5,000	65,000	1904.....	5,277	23,247	1917.....	1,422	7,789
1892.....	5,180	69,070	1905.....		21,568	1918.....	933	5,124
1893.....	7,112	90,825	1906.....		24,446	1919*	1,632	10,853
1894.....		75,550	1907.....	4,335	20,056	1920.....	(a)	14,200
1895.....		58,900	1908.....	2,950	13,496	1921.....	(b)	22,325
1896.....		53,370	1909.....	4,000	19,000	1922.....	1,899	14,871
1897.....		42,800	1910.....	3,959	18,492	1923.....	1,836	17,289
1898.....		40,791	1911.....	1,833	8,248	1924-1929.....		
						1930.....	150	3,000
						Total.....		1,329,292

*1903 to 1919 inclusive quantity recorded in squares.
(a) 1,532 squares valued at \$12,362 and 240 tons crushed slate at \$1,838.
(b) 415 squares valued at \$4,063 and 2,232 tons crushed slate at \$18,262.

Table 367.—Imports of Slate into Canada, 1928-1930

	1928		1929		1930	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Roofing.....Squares	7,453	95,468	9,504	123,793	4,349	59,411
School-writing.....		83,248		96,296		91,355
Pencils.....		8,036		9,398		6,506
Mantles and manufactures of slate, n.o.p.		52,544		67,151		48,706
Total.....		239,296		296,638		205,978

THE STONE INDUSTRY IN CANADA

Including (1) The Stone Quarrying Industry and (2) The Monumental and Ornamental Stone Industry

(1) PRIMARY PRODUCTION—The Stone Quarrying Industry

Statistics of the stone industry as set forth in the general tables of this report have been confined to quarrying operations and to the production of dressed stone when this operation is carried on in conjunction with the quarrying. The kinds of stone quarried in Canada include granite (trap-rock, syenite and other igneous rock), limestone, marble and sandstone. In 1930, granite was produced in Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia; limestone was obtained in all provinces except Prince Edward Island and Saskatchewan; marble was quarried in Quebec, Manitoba and British Columbia; and the sandstone output had its source in Nova Scotia, New Brunswick, Quebec, Ontario, Alberta and British Columbia.

Shipments of stone from Canadian quarries during 1930 amounted to 9,994,506 tons valued at \$13,034,209 as compared with 9,622,424 tons worth \$12,066,532 in 1929. The 1930 production consisted of 7,732,675 tons of limestone, 1,851,132 tons of granite, 384,610 tons of sandstone, and 26,089 tons of marble. Ontario was the leading stone producing province, accounting for 53.9 per cent of the total tonnage shipped; Quebec followed with 38.2 per cent and the other provinces, in order of tonnages produced, were British Columbia, Nova Scotia, Manitoba, New Brunswick and Alberta. During the year 64 per cent of the limestone production was marketed as crushed stone for concrete aggregates, road metal and similar uses; 1.5 per cent as building, monumental and ornamental stone; 5 per cent for flux; 0.5 per cent for use in sugar refineries and various chemical plants; 2 per cent in pulp and paper mills; the remaining percentage consisted of rubble and riprap, small tonnages of flagstones, agricultural limestone, poultry grit, stucco, etc.

The production of marble in Canada during the period 1886-1896 was relatively small, totalling 3,391 tons valued at \$45,837. Records from 1897 to 1907 do not show any production of marble in Canada. Development of quarries at Philipsburg and South Stukeley, Quebec; Bancroft and Marble Bluff, Ontario; in The Pas district, Manitoba; and on Nootka Sound and at Marblehead in the Ainsworth Mining Division, British Columbia, stimulated an increased output and in 1908 marble shipments were valued at \$125,000. In 1912 the total valuation of the marble production was \$260,764, the maximum output for this industry in both quantity and value was reached in 1930 when 4,685 tons of building and monumental marble and 21,404 tons in crushed or other forms were shipped from Quebec, Ontario, Manitoba and British Columbia quarries.

The output of the Quebec granite quarries during 1930 far exceeded in quantity and value that of any previous year amounting to 711,943 tons valued at \$2,042,783. One of the most important contracts awarded for granite in 1930 was in connection with the construction of the St. Joseph Oratory, Montreal; it is estimated that 300,000 cubic feet of building stone valued at \$2,300,000 will be employed in its construction.

Table 368.—Production of Granite in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	319,398	937,894	1926.....	1,064,423	1,574,627
1922.....	457,925	1,486,250	1927.....	730,049	1,383,557
1923.....	398,432	1,159,303	1928.....	1,195,810	2,366,946
1924.....	419,971	1,013,345	1929.....	1,728,165	3,080,815
1925.....	971,718	2,014,535	1930.....	1,851,132	3,379,951

Table 369.—Production of Limestone and Sandstone in Canada, 1921-1930

(For the years 1886 to 1920 see Mineral Production of Canada, 1928)

Year	Limestone		Sandstone		Year	Limestone		Sandstone	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1921.....	3,322,024	5,155,046	28,426	78,036	1926.....	5,283,745	5,657,328	44,127	112,347
1922.....	3,152,124	4,175,941	25,221	80,908	1927.....	6,438,379	7,145,917	132,799	232,793
1923.....	3,687,663	4,475,921	22,766	66,547	1928.....	6,949,420	7,267,437	100,951	223,236
1924.....	4,249,061	4,831,684	94,603	240,273	1929.....	7,720,840	8,172,681	159,407	398,974
1925.....	4,643,853	5,049,563	87,502	145,757	1930.....	7,732,675	8,075,616	384,610	769,060

Table 370.—Production of Marble in Canada, 1921-1930

(For the years 1886 to 1920 see Annual Report Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1921.....	1,650	172,720	1927.....	5,295	521,572
1922.....	1,912	231,894	1927.....	5,209	503,037
1923.....	2,473	201,518	1928.....	7,753	414,682
1924.....	4,379	322,455	1929.....	14,012	414,062
1925.....	3,046	254,922	1930.....	26,089	809,582

Table 371.—Production of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1929

Item		Nova Scotia	New Brun- swick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—									
Rough.....	tons	5,487	194	56,959	21,194	35,015		3,878	122,727
	\$	71,027	4,673	271,148	111,285	210,891		42,893	711,917
Dressed.....	tons	25	1,592	45,420	3,971	12,261	208	45	63,522
	\$	1,000	87,624	1,887,474	79,481	558,505	12,500	4,200	2,130,754
Monumental and ornamental—									
Rough.....	tons	157	882	8,226	133	35		196	9,629
	\$	1,844	14,752	102,667	2,745	450		5,282	127,740
Dressed.....	tons	430	674	1,694	70			984	3,852
	\$	11,760	42,353	46,628	2,626			51,165	154,532
Flagstone.....	tons			114	1,645				1,759
	\$			114	17,541				17,655
Curbstone.....	tons		301	35,321		39		123	35,784
	\$		3,614	221,748		393		1,010	226,765
Paving blocks.....	tons		1,572	10,717	5,717			3	18,009
	\$		15,675	98,123	50,479			50	159,327
Limestone, for flux.....	tons	106,692		206	318,910		743	27,046	453,597
	\$	109,509		309	243,868		1,500	21,613	376,799
Limestone for sugar factories, chemical works, etc.....	tons		17,580	90,638	155,068		2,906	52,844	319,036
	\$		28,600	97,228	137,947		5,242	81,380	350,397
Poultry grit.....	tons				3,000			56	3,056
	\$				12,000			522	12,522
Ground limestone for agricultural use.....	tons	1,525	2,130	22,790	2,127			172	28,744
	\$	5,875	4,260	59,288	1,702			708	71,833
Rubble and riprap.....	tons	6,724		635,567	130,844	25,463		148,475	947,073
	\$	11,439		563,365	111,040	20,365		135,195	841,404
Crushed.....	tons	143,666	2,427	2,576,819	4,596,993	119,296	1,326	175,109	7,615,636
	\$	163,768	3,419	2,474,787	3,965,549	104,413	5,304	167,637	6,884,857
Total.....	tons	264,706	27,352	3,484,471	5,239,672	192,109	5,183	408,931	9,622,424
	\$	376,222	204,970	5,317,859	4,736,263	895,017	24,546	511,655	12,066,532
Per cent of total.....	Quantity	2.75	0.28	36.22	54.45	2.00	0.05	4.25	100.00
	Value	3.12	1.70	44.07	39.25	7.42	0.20	4.24	100.00

Table 372.—Production of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1930

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	8,900	750	28,662	22,104	28,402		2,467	91,235
\$	94,250	3,375	167,135	134,381	192,318		13,835	605,294
Dressed..... tons	20	784	51,116	12,971	12,892	117	4,019	81,919
\$	1,000	39,020	2,277,989	184,269	787,934	4,500	284,772	3,579,484
Monumental and ornamental—								
Rough..... tons	325	668	6,416	56	91		933	8,489
\$	6,650	15,470	87,679	641	709		10,641	121,790
Dressed..... tons	410	485	880	73			407	2,255
\$	19,700	34,672	33,487	2,770			24,452	115,981
Flagstone..... tons			42	10,358				988
\$			979	316				10,400
Curbstone..... tons			30,537	516	206			32,139
\$		16,060	164,736	5,845	206		1,050	187,597
Paving blocks..... tons		43	7,640	2,849			36	10,568
\$		540	59,523	23,606			525	84,194
Lining open-hearth furnaces..... tons					939			939
\$					1,643			1,643
Chemical—								
Flux in iron and steel plants..... tons	73,402			161,427	2,424	1,314		238,567
\$	71,102			119,020	3,733	2,628		197,883
Flux in smelters..... tons			821	117,330			26,321	144,472
\$			821	87,621			22,282	110,724
Glass factories..... tons						1,046		1,046
\$						1,569		1,569
Pulp and paper mills..... tons	5,099	21,719	68,975	40,038	13,506		16,108	165,445
\$	10,943	42,144	62,864	37,386	15,243		26,113	194,693
Sugar refineries..... tons		50		23,337	4,629	4,137		32,153
\$		300		16,336	5,778	7,239		29,653
Other chemical uses..... tons			1,337	3,436				4,773
\$			4,107	2,405				6,512
Whiting..... tons	72							72
\$	1,338							1,338
Asphalt..... tons			7,487	11,240				18,727
\$			23,684	49,851				73,535
Dusting coal mines..... tons						1,289		1,289
\$						5,800		5,800
Agricultural purposes..... tons	1,368	18,493	26,429	13,880			1,714	61,884
\$	5,162	55,397	67,833	43,191			10,171	181,754
Poultry grit..... tons				1,938			532	2,470
\$				11,264			5,404	16,668
Stucco dash..... tons			4,503	3,678			1,463	9,644
\$			26,312	23,676			13,160	63,148
Terrazzo flooring..... tons	4,472			229				4,701
\$	4,918			1,145				6,063
Rubble and riprap..... tons		23,891	650,045	211,704	5,793		126,918	1,018,351
\$		20,141	453,570	110,384	7,066		115,288	706,449
(Concrete aggregate..... tons	10,000		1,304,074	800,847	33		150	2,115,104
\$	29,952		913,924	679,586	42		400	1,623,904
Crushed stone { Road metal..... tons	48,395	43,750	1,626,345	2,000,140	78,163		113,452	3,910,245
\$	75,301	57,750	1,406,317	1,700,828	70,807		123,932	3,434,935
{ Railroad ballast..... tons			2,817	1,967,694			66,470	2,636,981
\$			2,763	1,605,065			66,470	1,674,298
Total..... tons	152,463	111,612	3,813,126	5,396,233	147,078	7,903	361,091	9,994,506
\$	320,316	284,869	5,752,786	4,850,528	1,085,479	21,736	718,495	13,034,299
Per cent of total..... Quantity	1.5	1.1	38.2	54.0	1.5	1.0	3.6	100.0
Value	2.5	2.2	44.1	37.2	8.3	0.2	5.5	100.0

Table 373.—*Production of Stone in Canada, by Kinds and by Provinces, 1929 and 1930

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1929		\$		\$		\$		\$
Nova Scotia.....	76,742	98,357	175,981	199,384	132	2,515	11,851	75,966
New Brunswick.....	5,142	91,610	20,710	33,360			1,500	80,000
Quebec.....	508,471	1,623,860	2,827,740	3,139,389	13,081	397,074	135,179	157,536
Ontario.....	850,927	926,977	4,380,706	3,759,357			8,039	49,929
Manitoba.....			191,506	885,826	603	9,191		
Alberta.....			4,975	12,046			208	12,500
British Columbia.....	286,883	340,011	119,222	143,319	196	5,282	2,630	23,043
Canada.....	1,728,165	3,080,815	7,720,840	8,172,681	14,012	414,062	159,407	398,974
1930								
Nova Scotia.....	7,856	38,107	79,941	88,545			64,666	193,664
New Brunswick.....	46,209	139,212	40,262	97,841			25,141	47,816
Quebec.....	711,943	2,042,783	2,811,300	2,774,539	11,619	717,362	283,264	218,102
Ontario.....	856,124	876,110	4,524,661	3,876,527	7,345	51,085	8,103	46,806
Manitoba.....			146,316	1,075,485	762	9,994		
Alberta.....			7,786	17,236			117	4,500
British Columbia.....	229,000	283,739	122,409	145,443	6,363	31,141	3,319	258,172
Canada.....	1,851,132	3,379,951	7,732,675	8,075,616	26,089	809,582	384,610	769,060

*For production of slate see Table 366.

Table 374.—Production of Stone in Canada by Kinds, Showing Purposes for Which Used, 1929

Kind	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building—								
Rough.....	15,082	137,353	93,766	432,959	914	22,927	12,965	118,678
Dressed.....	23,869	746,537	36,037	944,491	1,908	347,256	1,708	92,500
Monumental and ornamental—								
Rough.....	9,272	121,053	126	955	231	5,732		
Dressed.....	3,153	149,810	699	4,722				
Flagstone.....			129	264			1,630	17,391
Curbstone.....	35,745	226,372	39	393				
Paving blocks.....	18,009	159,327						
Limestone, for flux.....			453,597	376,799				
Limestone for sugar factories, chemical works, etc.....			311,686	339,739	7,350	10,658		
Poultry grit.....	2	10	3,054	12,512				
Ground limestone for agricultural use.....			28,744	71,833				
Rubble and riprap.....	231,038	204,287	677,837	591,385			38,198	45,732
Crushed stone.....	1,391,995	1,336,066	6,115,126	5,396,629	3,609	27,489	104,906	124,673
Total.....	1,728,165	3,080,815	7,720,840	8,172,681	14,012	414,062	159,407	398,974

Table 375.—*Production of Stone in Canada by Kinds, Showing Purposes for Which Used, 1930

Kind	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building—								
Rough.....	13,402	149,535	63,625	329,013	308	8,740	13,950	118,006
Dressed.....	24,909	1,189,120	49,688	1,416,277	3,386	687,115	3,936	286,972
Monumental and ornamental—								
Rough.....	7,378	110,285	120	815	991	10,690		
Dressed.....	2,045	111,504	210	3,577				
Flagstone.....			172	503			816	9,897
Curbstone.....	31,617	181,846	206	206			316	5,845
Paving blocks.....	10,568	84,194						
Lining open-hearth furnaces.....			939	1,643				
Chemical—								
Flux in iron and steel plants.....			238,567	197,383				
Flux in smelters.....			144,472	110,724				
Glass factories.....			1,046	1,569				
Pulp and paper mills.....			157,253	181,908	8,192	12,785		
Sugar refineries.....			32,153	29,653				
Other chemical uses.....			4,773	6,512				
Whiting.....			72	1,338				
Asphalt filler.....			16,442	57,579	1,500	15,000	785	956
Dusting coal mines.....			1,289	5,800				
Agricultural purposes.....			61,884	181,754				
Poultry grit.....	2	65	530	5,339	1,938	11,264		
Stucco dash.....			400	600	9,182	62,298	62	250
Terrazzo flooring.....					229	1,145	4,472	4,918
Rubble and riprap.....	302,626	209,490	679,995	460,411	363	545	35,367	36,003
Crushed stone—								
Concrete aggregate.....	512,688	307,338	1,368,503	1,152,166			233,913	164,400
Road metal.....	271,393	352,570	3,547,859	2,940,552			90,993	141,813
Railroad ballast.....	674,504	684,004	1,362,477	990,294				
Total.....	1,851,132	3,379,951	7,732,675	8,075,616	26,089	809,582	384,610	769,060

* For production of slate see Table 366.

Table 376.—Production in Canada, by Kinds and by Provinces, Imports and Exports of Stone, 1928-1930

	1928		1929		1930	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION, BY KINDS—		\$		\$		\$
Granite.....	1,195,810	2,366,946	1,728,165	3,080,815	1,851,132	3,379,951
Limestone.....	6,949,420	7,267,437	7,720,840	8,172,681	7,732,675	8,075,616
Marble.....	7,753	414,682	14,012	414,062	26,089	809,582
Sandstone.....	100,951	223,236	159,407	398,974	384,610	769,060
Slate.....					150	3,000
Total.....	8,253,934	10,272,301	9,622,424	12,066,532	9,994,656	13,037,209
PRODUCTION, BY PROVINCES—						
Nova Scotia.....	121,168	213,775	264,706	376,222	152,463	320,316
New Brunswick.....	46,332	142,981	27,352	204,970	111,612	284,869
Quebec.....	2,992,192	4,849,200	3,484,471	5,317,859	3,818,126	5,752,786
Ontario.....	4,581,929	4,041,568	5,239,672	4,736,263	5,396,233	4,850,528
Manitoba.....	235,864	608,217	192,109	895,017	147,078	1,085,479
Alberta.....	5,010	24,740	5,183	24,646	7,903	21,736
British Columbia.....	271,439	391,820	408,931	511,655	361,241	721,495
Canada.....	8,253,934	10,272,301	9,622,424	12,066,532	9,994,656	13,037,209
IMPORTS—						
Building stone, other than marble or granite, sawn on more than two sides, but not sawn on more than four sides.....	306	4,085	471	6,285	139	2,029
Building stone other than marble or granite, planed, turned, cut or further manufactured than sawn on four sides.....	259	27,781	1,826	77,685	1,492	78,904
Flagstone, rough sandstone, and all building stone, not hammered, sawn or chiselled.....		214,977		307,013		309,930
Flagstone and building stone, other than marble or granite, sawn on not more than two sides.....		213,448		233,084		107,783
Granite, rough, not hammered or chiselled.....				65,036		78,233
Granite, sawn only.....		7,637		22,799		8,999
Granite, manufactures of, n.o.p.....		63,932		44,857		42,158
Granite monuments.....		*129,466		137,359		132,622
Paving blocks.....		10,919				2,876
Marble, rough, not hammered or chiselled.....		137,120		237,680		243,621
Marble, sawn or sand rubbed, not polished.....		170,074		267,497		264,869
Marble, manufactures of, n.o.p.....		126,729		187,717		170,001
Refuse stone.....	597,134	373,453	645,768	405,077	303,462	233,182
Manufactures of stone, n.o.p.....		70,826		76,364		65,301
Total.....		1,550,447		2,068,453		1,740,508
EXPORTS—						
Crushed stone.....	128,379	209,852	116,950	200,000	136,837	235,406
Granite and marble, unwrought.....	2,529	26,034	2,467	23,189	1,768	21,913
Freestone, limestone, and other building stone, unwrought.....	383	3,664	661	8,867	2,149	15,829
Dressed stone.....		10,665		5,065		4,110
Total.....		250,215		237,121		277,258

* April 1, to December 31, 1928.

Table 377.—Capital Employed in the Stone Quarrying Industry in Canada, by Provinces, 1929 and 1930

Province	1929				1930			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	1,102,598	23,130	10,336	1,136,064	1,199,358	31,223	16,531	1,247,112
New Brunswick.....	86,100	21,596	22,807	130,503	250,728	46,586	54,573	351,887
Quebec.....	4,783,119	470,271	986,142	6,239,532	4,401,095	513,786	1,085,360	6,000,241
Ontario.....	9,792,035	519,874	687,879	10,999,788	9,503,183	443,385	2,520,687	12,467,255
Manitoba.....	714,796	143,882	217,857	1,076,535	528,832	81,452	201,815	812,099
Alberta.....	4,000			4,000				
British Columbia.....	839,227	85,341	78,768	1,003,336	1,089,045	87,922	140,827	1,317,794
Canada.....	17,321,875	1,264,094	2,003,789	20,589,758	16,972,241	1,204,354	4,019,793	22,196,388

Table 378.—Employees, Salaries and Wages in the Stone Industry in Canada, by Provinces, 1929 and 1930

Province	*Average number of employees			Salaries and Wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
1929						
Nova Scotia.....	7	163	170	12,454	154,621	167,075
New Brunswick.....	9	123	132	20,264	98,494	118,758
Quebec.....	158	2,892	3,256	238,792	2,452,577	2,691,369
Ontario.....	108	1,609	1,717	233,479	1,512,882	1,746,361
Manitoba.....	20	375	395	52,120	376,114	428,234
Alberta.....	.....	7	7	.....	10,147	10,147
British Columbia.....	14	196	210	30,002	267,815	297,817
Canada.....	316	5,365	5,681	587,111	4,872,650	5,459,761
1930						
Nova Scotia.....	7	248	255	11,375	166,229	177,604
New Brunswick.....	16	194	210	36,472	139,461	175,933
Quebec.....	139	3,117	3,256	259,260	2,406,397	2,665,657
Ontario.....	124	1,720	1,844	288,428	1,416,077	1,704,505
Manitoba.....	21	306	327	58,666	314,840	373,506
Alberta.....	.....	7	7	.....	3,400	3,400
British Columbia.....	24	269	293	63,162	378,444	441,606
Canada.....	331	5,861	6,192	717,363	4,824,848	5,542,211

*See note page 37.

Table 379.—Wage-Earners in the Stone Industry in Canada, by Months and by Provinces, 1930

Month	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
January.....	84	52	1,324	473	170	.....	232	2,335
February.....	63	61	1,416	572	164	.....	253	2,529
March.....	76	92	1,556	961	207	.....	270	3,162
April.....	124	120	2,001	1,271	284	.....	258	4,053
May.....	246	157	2,756	1,587	356	.....	258	5,360
June.....	245	168	3,049	1,715	356	6	246	5,785
July.....	264	200	3,059	1,787	365	7	236	5,918
August.....	267	232	2,975	1,717	364	7	240	5,802
September.....	273	190	2,937	1,625	327	8	248	5,605
October.....	228	204	2,673	1,428	296	.....	256	5,085
November.....	138	97	2,363	1,111	258	.....	248	4,215
December.....	127	77	1,842	719	174	.....	221	3,160

(2) The Monumental and Ornamental Stone Industry

This industry includes the cutting, polishing or other finishing of stone in plants not operated in conjunction with quarries.

Production from the stone dressing works in 1930 amounted in value to \$8,355,605. This was a new record for the industry and exceeded the 1929 output by about two per cent. During 1930 a total of 226 plants in Canada were engaged solely in the cutting or dressing of stone for building or ornamental purposes. Of this total 118 plants were located in the province of Ontario, 44 in Quebec, 15 in Manitoba, 12 in British Columbia, 11 in New Brunswick, 11 in Nova Scotia, 8 in Saskatchewan, 5 in Alberta, and 2 in Prince Edward Island. These concerns had an operating capital of \$7,468,687 and afforded employment to a monthly average of 1,919 people who received \$3,044,877 as salaries and wages. Unfinished stone purchased for polishing or dressing cost \$2,759,870 and the selling value of the finished stone was \$8,355,605, giving \$5,595,735 as the value added to purchased materials by the cutting and finishing processes.

Table 380.—Number of Plants, Employees and Value of Products of the Monumental and Ornamental Stone Industry in Canada, by Provinces, 1929 and 1930

Province	1929			1930		
	Number of plants	Number of employees	Selling value of products	Number of plants	Number of employees	Selling value of products
			\$			\$
Prince Edward Island and Nova Scotia.....	12	48	188,772	13	51	200,387
New Brunswick.....	11	74	180,850	11	75	174,082
Quebec.....	45	413	1,486,177	44	438	1,618,065
Ontario.....	116	1,002	5,064,697	118	1,036	5,421,029
Manitoba.....	13	143	547,779	15	128	307,398
Saskatchewan.....	7	62	280,263	8	40	163,426
Alberta.....	5	59	216,685	5	74	217,822
British Columbia.....	11	62	253,837	12	71	253,398
Canada.....	220	1,863	8,224,060	226	1,919	8,355,605

Table 381.—Products of the Monumental and Ornamental Stone Industry in Canada, 1929 and 1930

Item	1929	1930
	Total selling value at works	Total selling value at works
	\$	\$
Granite, cut and polished—(a) Monuments.....	1,815,463	1,815,143
(b) For building purposes.....	465,185	902,519
Marble, cut and polished—(a) Monuments.....	391,947	350,323
(b) For building purposes.....	1,621,112	1,339,108
Marble chips and dust.....	23,802	29,625
Limestone—(a) Monuments and bases.....	325,876	319,472
(b) For building purposes.....	2,739,504	2,706,390
Finished monuments, lettered only.....	785,748	816,308
Other products.....	55,423	76,717
Total.....	8,224,060	8,355,605

CHAPTER X

DIRECTORY

In the following pages the names and addresses of all the principal operators in the Canadian mining industry are given and the location of the properties worked in 1930 is also shown.

METAL MINING INDUSTRIES

Alluvial Gold Mining Industry

Name	Address	Location
QUEBEC		
Mill Creek Gold Mines, Limited.....	719 Insurance Exchange Bldg., Montreal.	Beauceville.
BRITISH COLUMBIA		
Barin, E. W.....	Big Bar Creek.....	Bench Lease.
Belbrough, G. W.....	Box 1000, Swift Current, Saskatchewan.	Vernon.
Bobb and Colvin.....	Bridge River.....	Marshall Creek.
Bride, Maurice.....	Atlin.....	Lynx Creek.
Brown, Frank and John Highland.....	Atlin.....	Wright Creek.
Canyon Gold Placer Company.....	c/o C. W. Hartman, Princeton.....	Yale District.
Cassiar Hydraulic Mines, Limited.....	609 Bank of Nova Scotia Bldg., Vancouver.	Cassiar District.
Cedar Creek Mining Company.....	Likely.....	Cariboo District.
Christofersen, Charles.....	Tulameen.....	Tulameen.
Compagnie Française des Mines d'Or du Canada.....	19 rue d'Aumale, Paris, France.....	Atlin.
C. M. & S. Company of Canada, Limited.....	Trail.....	Atlin and Omineca Mining Divisions.
Crawford, Frank.....	Dease Lake.....	Stikine
Daly & Johnson.....	Big Bar Creek.....	Clinton Mining Division.
Dang Sang.....	Barkerville.....	Slough Creek.
Dease Creek Mines Corporation.....	901 Republic Bldg., Seattle, Wash., U.S.A.	Dease Creek.
Donovan Hydraulic.....	Cottonwood.....	Donovan Creek.
Falek, Emil M.....	Cottonwood.....	Anderson Creek.
Falconer, Duncan K.....	Discovery.....	Spruce Creek.
Fales, Dr. J. E. & O. L. Willoughby.....	Lumby.....	Vernon.
Fowler, Luke.....	Hazelton.....	Manson Creek.
French Creek Development Company, Limited.....	502 Stock Exchange Bldg., Vancouver.	Revelstoke Mining Div.
Gaines, Paul.....	Barkerville.....	Grouse Creek.
Granite Creek Dredging Company.....	746 Peyton Bldg., Spokane, Wash., U.S.A.	Similkameen Mining Div.
Hong, W. M.....	Barkerville.....	Last Chance Creek.
Hultgren, Ole.....	Atlin.....	Spruce Creek.
Lovgren, Ole.....	Atlin.....	Atlin Lake.
Lowhee Mining Co., Limited.....	1109 Rust Bldg., Tacoma, Wash., U.S.A.	Cariboo.
Maley, Len.....	Revelstoke.....	McCullough Creek.
Matthews, Isaac.....	Spruce Creek.....	Lovell Group Leases.
Matthews, Isaac.....	Atlin.....	Spruce Creek.
McCall, James L.....	Barkerville.....	Begges Gulch.
McKinnon, C. E.....	Atlin.....	Spruce Creek.
Millwood, M. E.....	10445 83rd Ave., Edmonton, Alta.....	Omineca Mining Division.
Morse, H. O., McKechnie Wm. and Bratt, L.....	Atlin.....	Spruce Creek.
Munro, Malcolm.....	Big Bar Creek.....	Lillooet.
Murphy, Nathan.....	Atlin.....	O'Donnell River.
Omineca Gold Dredging Company.....	921 Lloyd Bldg., Seattle, Wash., U.S.A.	Manson Creek.
Paymore Mines, Limited.....	303 Lombard Bldg., Winnipeg, Man.	Louis and Dixon Creeks.
Pini Marco and Company.....	Spruce Creek.....	Atlin Mining Division.
Placer Engineers.....	c/o Lennie & McMaster, 733 Granville, Vancouver.	Four Mile Pine, Rabbit and Keithley Creeks.
Point Hydraulic Mining Company.....	Barkerville.....	Cariboo Mining Division.
Powe, George.....	Gerrard.....	Kaslo Mining Division.
Prnich Tom.....	O'Donnell River.....	O'Donnell River.
Rear, Mrs J. S.....	Palo Alto, California, U.S.A.....	Cherry Creek.
Roddick, J. P.....	Barkerville.....	Pine Creek.
Slade, W. C.....	Cottonwood.....	Mosquito Creek.
Slate Creek Consolidated Placers, Limited.....	709 Dominion Bank Bldg., Vancouver.	Tulameen District.

Alluvial Gold Mining Industry—Concluded

Name	Address	Location
<i>BRITISH COLUMBIA—Concluded</i>		
Sotheran, Garnet.....	Tulameen.....	Similkameen Mining Division.
Stevens, Joel.....	Barkerville.....	New California Placer Claims.
Tinting, John.....	Spruce Creek.....	Spruce Creek.
Tong Sing Tong.....	Barkerville.....	Slough Creek.
Trehouse Hydraulic Company.....	Barkerville.....	Cunningham Creek.
Turnquist, Emil.....	Atlin.....	Atlin.
Williams, C. M.....	McCullough Creek.....	Revelstoke.
Williams, James F.....	Cottonwood.....	Cariboo.
Wilson, Sigurg.....	Bull River.....	Fort Steele Mining Division.
Wing & Benjamin.....	Wrangell, Alaska.....	Quartz Creek.
Woodhill Mines, Limited.....	520 Stock Exchange Bldg., Vancouver.	Granite Creek.
Yeager, A. C. and Green, F.....	Lumberton.....	Sunrise Lease.
<i>YUKON</i>		
McDonald, McCormick & Stewart.....	Glacier Creek.....	Yukon Territory.
Yukon Consolidated Gold Corporation, Ltd.....	Dawson.....	Yukon Territory.

Antimony Mining Industry

Name	Address	Name of Mine	Location of Mine
<i>NEW BRUNSWICK</i>			
*Lake George Mines, Limited.....	Lake George.....	Lake George.....	Lake George.

Auriferous Quartz Mining Industry

<i>NOVA SCOTIA</i>			
Beaver Dam Mines.....	Upper Musquodoboit.....	Beaverdam.....	Upper Musquodoboit.
Moose River Gold Mining Co.....	Westville.....		Moose River.
Renfrew Gold Mines, Limited.....	Box 117, New Glasgow.....	Renfrew.....	Hants Co.
Victory Gold Mines, Limited.....	Goldboro.....	Victory.....	Stormont.
<i>QUEBEC</i>			
Granada Rouyn Mining Co., Limited.....	Rouyn.....	Granada Rouyn.....	Rouyn.
O'Brien and Fowler, Limited (Cadillac).....	Ottawa Elec. Bldg., Ottawa, Ont.	O'Brien-Cadillac.....	Cadillac Tp.
Siscoe Gold Mines, Limited.....	418A Insurance Exchange Bldg., Montreal.	Siscoe.....	Dubuisson Tp.
*Pandora Gold Ltd.....	New Liskeard, Ont.....	Pandora.....	Cadillac Tp.
<i>ONTARIO</i>			
<i>Boston Creek Area—</i>			
Barry Hollinger Gold Mines, Limited.....	504 General Assurance Bldg., Toronto.	Barry Hollinger.....	Pacaud Tp.
*Telluride Gold Mines of Canada, Limited.	405 Northern Ontario Bldg., Toronto.	Telluride.....	Skead Tp.
<i>Kenora Area—</i>			
Botham Mine.....	Ideal Drug Store, Sioux Look-out.	Botham.....	N. W. Ontario.
*Kenora Prospectors & Miners, Limited	16th Floor, 100 Adelaide St. W. Toronto.	{ Mikado Mine..... { Cornucopia Mine..... { King Mine.....	Shoal Lake. Lake of the Woods. Kenora.
<i>Kirkland Lake Area—</i>			
*Bidgood Consolidated Mines, Limited.	Suite 32, 171 Yonge St., Toronto 2.	Bidgood.....	Kirkland Lake.
*Golden Summit Mines, Limited.....	594 Bloor St. W., Toronto.....	Golden Summit.....	Maisonville Tp.
Kirkland Lake Gold Mining Co., Limited.	930 Bank of Commerce Bldg., Toronto 2.	Kirkland Lake.....	Kirkland Lake.
Lake Shore Mines, Limited.....	Kirkland Lake.....	Lake Shore.....	Kirkland Lake.
Sylvanite Gold Mines, Limited.....	Kirkland Lake.....	Sylvanite.....	Kirkland Lake.
Teck-Hughes Gold Mines, Limited.....	Kirkland Lake.....	Teck-Hughes.....	Kirkland Lake.
Wright-Hargreaves Mines, Limited.....	Bridgeburg.....	Wright-Hargreaves.....	Kirkland Lake.
*Lakeland Gold Mines, Ltd.....	19 Sun Life Bldg., Hamilton, Ont.	Lakeland.....	Maisonville Tp.
<i>Larder Lake Area—</i>			
*Ritchie Gold Mines, Limited.....	71 York St., Toronto.....	Ritchie.....	Gauthier Tp.

* Operating but not producing.

Auriferous Quartz Mining Industry—Concluded

Name	Address	Name of Mine	Location of Mine
ONTARIO—Concluded			
<i>Michipicoten Area—</i>			
Cooper Gold Mines, Limited.....	1206 Star Bldg., Toronto.....	Jubilee and Minto.....	Soo Mining Division.
Power and Mines Corporation, Limited (Grace).....	1254 St. Catherine St. W., Montreal, Que.	Grace.....	Michipicoten Dist.
*Towagmac Exploration Co., Limited	1108 Dominion Square Bldg., Montreal, Que.	Michael Boyle, option	Goudreau.
<i>Northwestern Ontario Area—</i>			
*British Canadian Mines, Limited....	318 Bloor Bldg., Bloor and Bay Sts., Toronto.	Foley.....	Mine Centre.
*Moss Mines, Limited.....	75 Sparks St., Ottawa.....	Moss (Huronian).....	Kashabowie.
*Stone, Wm. E. & Son.....	Mine Centre.....	Golden Star and Isabella	Mine Centre.
<i>Patricia District—</i>			
Howey Gold Mines, Limited.....	1206 Star Bldg., Toronto.....	Howey.....	Red Lake.
*Central Patricia Mines, Ltd.....	320 Bay St., Toronto.....	Central Patricia.....	Pickle Lake.
<i>Porcupine Area—</i>			
Ankerite Gold Mines, Limited.....	Box 535, South Porcupine.....	Ankerite.....	Deloro Tp.
*Canusa Mining & Exploration Co., Limited.	1701 Metropolitan Bldg., Toronto.	Canusa.....	Whitney Tp.
Coniaurum Mines, Limited.....	100 Adelaide St., W. Toronto.	Coniaurum.....	Schumacher.
Dome Mines, Limited.....	36 Toronto St., Toronto.	Dome.....	Tisdale Tp.
*Hayden Gold Mines Company, Limited.	611 Federal Bldg., 85 Richmond St., Toronto.	Hayden.....	Ogden and Deloro.
Hollinger Consolidated Gold Mines...	Timmins.....	Hollinger.....	Timmins.
March Gold, Limited.....	320 East Genesee St., Buffalo, N. Y.	March Gold.....	Deloro Tp.
McIntyre Porcupine Mines, Limited...	Schumacher.....	McIntyre, Porcupine...	Schumacher.
Porcupine United Gold Mines, Limited	405 Walbridge Bldg., Buffalo, N. Y.	Rochester.....	Timmins.
Vipond Consolidated Mines, Limited..	1206 Star Bldg., 80 King St. W., Toronto 2.	Vipond.....	Tisdale Tp.
West Dome Lake Gold Mines, Limited	New Liskeard.....	West Dome.....	Tisdale Tp.
<i>Thunder Bay Area—</i>			
St. Anthony Gold Mines, Limited.....	255 Bay St., Toronto.....	St. Anthony.....	Sturgeon Lake.
*Tashota Gold Mines, Limited.....	Tashota.....	Tashota.....	Kowkash Mining Division.
MANITOBA			
Central Manitoba Mines, Limited.....	301 Mining Exchange Bldg., Winnipeg.	Central Manitoba.....	Wadhope.
*San Antonio Mines, Limited.....	231 Curry Bldg., Winnipeg....	San Antonio.....	Bissett.
BRITISH COLUMBIA			
*Coalmont Gold Mines, Limited.....	435 Rogers Bldg., Vancouver.	Coalmont.....	Yale District.
*Calumario Gold Mines, Limited.....	45 Richmond St. W., Toronto.	Valhalla-Kleanza.....	Omineca Mining Division.
Hedley Gold Mining Company, Limited	Hedley.....	Nickel-Plate.....	Osoyoos.
I. X. L. Gold Mining Co.....	Rossland.....	I. X. L.....	Rossland.
McCarthy, James F.....	Grand Forks.....	Union.....	North Fork of Kettle River.
Midnight Mining Syndicate.....	Rossland.....	Midnight.....	Trail Creek Mining Division.
Pioneer Gold Mines of B.C., Limited...	Pioneer Mines.....	Pioneer.....	Pioneer Mines.
*Pre-Cambrian Gold Mines.....	1827 Smith Tower, Seattle, Wash., U.S.A.	Pre-Cambrian.....	Ewings Landing.
Premier Gold Mining Co., Limited.....	London Bldg., Vancouver.....	Prosperity, Premier....	Portland Canal.
Relief-Arlington Mines, Limited.....	Erie.....	Second Relief.....	Nelson.
Reno Gold Mines, Limited.....	Salmo.....	Reno.....	Sheep Creek.

Copper-Gold-Silver Mining Industry

QUEBEC			
*Abana Mines, Limited.....	Transportation Bldg., Montreal.	Abana.....	Desmeloizes Tp.
Aldermac Mines, Limited.....	1108 Dominion Sq. Bldg., Montreal.	Aldermac.....	Boischatel Tp.
*Alderson and MacKay, Incorporated...	1108 Dominion Sq. Bldg., Montreal.		
Amulet Mines, Limited.....	132 St. James St., Montreal.	Amulet.....	Rouyn Tp.
*Arntfield Gold Mines, Limited.....	303 Old Birks Bldg., Montreal.	Arntfield.....	Boischatel Tp.
*Arrowhead Consolidated Mines, Limited.	412 New Birks Bldg., Montreal.		Joannes Tp.
*Astoria Rouyn Mines, Limited.....	70 St. Paul St., Quebec.....		
*Bellehumeur Mining Company, Limited	38 King St. West, Toronto.		Laverlochère Tp.
*Brownlee Gold Mines, Limited.....	Rouyn, Que.	Brownlee.....	Rouyn Dist.
*Canadian American Copper Refining Co., Limited.	207 Notre Dame St. W., Montreal.		Eastman.

* Operating but not producing.

Copper-Gold-Silver Mining Industry—Continued

Name	Address	Name of Mine	Location of Mine
<i>QUEBEC—Concluded</i>			
*Chibougamau Prospectors, Limited....	740 Dominion Sq. Bldg., Montreal.		Chibougamau.
*Connell Mining & Exploration Co., Limited.	161 -320 Bay St., Toronto, Ont.		
Consolidated Copper & Sulphur Company.	Eustis, Que.	Eustis.	Ascot Tp.
*Copper Basin Gold Mines, Limited....	159 Craig St. W., Suite 611, Montreal.		Dubuisson Tp.
*Dugoss Mines, Limited.....	259 Pitt St., Cornwall, Ont....	Dugoss.	Duparquet Tp.
*Kitchener-Rouyn Mines, Limited.....	Kitchener, Ont.		Boischatel and Clericy Tps.
*Les Mines Lac Dufault, Limitée.....	4350 St. Denis, Montreal.....		Aiguebelle, Dufresnoy, Sasserat, Desmeloizes and Dupuy Tps.
*Mabell Mines, Limited.....	410 New Birks Bldg., Montreal	Mabell.	Clericy Tp.
*Navarre Mines, Limited.....	503 Concourse Bldg., Toronto, Ont.	Navarre.	Dufresnoy Tp.
Newbec Mines, Limited.....	603 Royal Bank Bldg., Toronto, Ont.	Newbec.	Dufresnoy and Rouyn Tps.
Noranda Mines, Limited.....	804 Royal Bank Bldg., Toronto, Ont.	Horne.	Noranda.
*Opemiska Copper Mines, Limited.....	110 Adelaide St., Toronto, Ont.	Opemiska.	Abitibi.
*Oriole Mines, Limited.....	401 Continental Life Bldg., Toronto, Ont.	Oriole.	Kirkland Lake and Crow River, Ont., and Montbray Tp., Que.
*Own Mines, Limited.....	474 6th Ave., Verdun, Montreal, Que.	Own.	Dupuy and Desmeloizes Tps.
*Queumont Mining Corporation of Canada, Limited.	350 Bay St., Toronto, Ont....	Queumont.	Noranda.
*San Rouyn Syndicate Reg'd.....	Rouyn		Rouyn.
*Sladen-Malartic Mines, Limited.....	48 Sparks St., Ottawa, Ont....		
S. S. Copper Mines, Limited.....	70 Wellington North, Sherbrooke.		South Stukely.
*Sullivan Gold Mines, Limited.....	159 Craig St. W., Montreal....	Sullivan.	Dubuisson Tp.
*Syndicate Amulet Montgomery.....	4350 St. Denis, Montreal.....		Aiguebelle, Dasserat, Destor and Dufresnoy Tps.
*Towagmac Exploration Co., Limited..	1108 Dominion Square Bldg., Montreal.		
Waite-Ackerman-Montgomery Mines, Limited.	804 Royal Bank Bldg., Toronto, Ont.	Waite-Montgomery.	Duprat Tp.
*Wasamac Mines, Limited.....	4350 St. Denis, Montreal.....	Wasamac.	Dasserat and Dufresnoy Tps.
*Windsor Mines, Limited.....	64 Napoleon, Quebec.....	Windsor.	Lasarre.
<i>ONTARIO</i>			
*Normac Development Co., Limited..	Blackburn Bldg., Ottawa.....		Algoma Dist.
*Shield Development Co., Limited....	75 Sparks St., Ottawa.....	Tip Top.	Kashabowie.
*Sudbury Basin Mines, Limited.....	16th Floor, 100 Adelaide St. W., Toronto.	Sudbury Basin.	Vermilion Lake.
Watkins, Harry G.....	Newtonbrook P.O.		Strathy Tp.
*White Lake Mines, Limited.....	301 Royal Bank Bldg., Toronto, Ont.	White Lake.	Algoma Dist.
Potter Doal Mines, Ltd.....	Matheson, Ont.....	Potter Doal.	Matheson.
<i>MANITOBA</i>			
Hudson Bay Mining & Smelting Co., Limited.	404 Dundas St., Woodstock, Ont.	Flin Flon.	Flin Flon.
*Sherritt Gordon Mines, Limited.....	16th Floor, 100 Adelaide St. W., Toronto, Ont.	Sherritt Gordon.	Cold Lake.
<i>BRITISH COLUMBIA</i>			
*Alexandria Mining Company.....	998 Thurlow St., Vancouver..	Alexandria.	Phillips Arm.
*American Copper Mines, Limited.....	411-602 Hastings St. W., Vancouver.	Diadem & Mills.	
Argentine Syndicate.....	Stewart, B.C.	Kenneth.	Glacier Creek.
Aurum Mines, Limited.....	510 Hastings St. W., Vancouver	Aurum.	Verona.
*Bayonne Gold Mines, Limited.....	Box 396, Nelson.	Bayonne.	Nelson Mining Div.
Britannia Mining & Smelting Co., Limited.	Britannia Beach.	Britannia.	Britannia Beach.
*Coast Copper Co., Limited.....	Trail.....	Old Sport.	Quatsino Mining Div.
*Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail.....	Iva Fern.	Nelson Mining Div.
*Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail.....	Molly Gibson.	Nelson Mining Div.
*Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail.....	Red Eagle.	Similkameen Mining Div.

* Operating but not producing.

Copper-Gold-Silver Mining Industry—Concluded

Name	Address	Name of Mine	Location of Mine
BRITISH COLUMBIA—Concluded			
*Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail.....	Rossland Properties....	Trail Creek Mining Div.
*Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail.....	B. R. C. Griswold.....	Lillooet Mining Div.
*Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail.....	Driftwood River Property.	Omineca Mining Div.
Dawson Gold Mines, Limited.....	510 Hastings St. W., Vancouver	Dawson.....	Verona.
*George Enterprise Mining Co., Limited	211 Pemberton Bldg., Victoria	George Enterprise.....	Portland Canal Mining Div.
*George Gold-Copper Mining Co., Limited.	Trail.....	George Gold-Copper....	Portland Canal Mining Div.
Granby Consolidated Mining, Smelting & Power Co., Limited.	1010 Hall Bldg., Vancouver..	Copper Mountain.....	Copper Mountain.
Granby Consolidated Mining, Smelting & Power Co., Limited.	1010 Hall Bldg., Vancouver..	Hidden Creek.....	Anyox.
Granby Consolidated Mining, Smelting & Power Co., Limited.	1010 Hall Bldg., Vancouver..	Bonanza.....	Anyox.
*McEachern, D.....	Olalla.....	Galconda.....	Olalla.
*Novak, Geo. J.....	Ashcroft.....	Transvaal.....	Kamloops Mining Div.
*Pathfinder Consolidated Mining Co....	Pullman, Wash., U.S.A.....	Pathfinder.....	Grand Forks.
*Peacock Mining Co., Limited.....	Elko.....	.....	.....
*Quatsino Copper-Gold Mines, Limited.	1208 Vancouver Block, 736 Granville St., Vancouver.	Quatsino.....	Quatsino Sound.
*Tiger Gold Group Syndicate.....	306 Bower Bldg., 543 Granville St., Vancouver.	Tiger.....	Osoyoos Mining Div.

Chrome Mining Industry

ONTARIO			
*Consolidated Chromium Corporation..	Suite 812-52 Vanderbilt Ave., New York City.	.....	Collins.
BRITISH COLUMBIA			
*Consolidated Mining & Smelting Co., Limited.	Trail.....	Flint Granular and Bear	Ashcroft.

Iron Mining Industry

NOVA SCOTIA			
Dominion Steel & Coal Corporation, Limited.	Sydney, N.S.....	Wabana.....	Bell Island, N'd'd.
QUEBEC			
Baie St. Paul Titanic Iron Ore Co.....	Baie St. Paul.....	Loughborough.....	Charlevoix Co.

Manganese Mining Industry

Name	Address	Name of Mine	Location of Mine
NOVA SCOTIA—			
Dominion Mining and Power Syndicate	556 Robie St., Halifax.....	Dean Cain and Chapter.	Lunenburg.
NEW BRUNSWICK—			
Manganese Mines, Limited.....	Elms Block, Moncton.....	.....	Albert Co.
BRITISH COLUMBIA—			
Smuggler Hill Development Co., Ltd.	Kamloops.....	Smuggler Group.....	Birch Island.

* Operating but not producing.

Molybdenite Mining Industry

Name	Address	Name of Mine	Location of Mine
BRITISH COLUMBIA			
*Dalhousie Mining Co., Limited.....	604 Bank of Toronto Bldg., Victoria.	Tidewater.....	Alice Arm.

Nickel-Copper Mining Industry

ONTARIO			
Falconbridge Nickel Mines, Limited....	100 Adelaide St. W., Toronto.	Falconbridge.....	Sudbury Dist.
International Nickel Co. of Canada, Limited.	Copper Cliff.....	Creighton, Froid, Garson, Levack.	Snider, McKim, Garson, Levack Tps.

Non-Ferrous Smelting and Refining Industry

Name	Address	Location
QUEBEC		
Aluminium Co. of Canada, Limited.....	46 King St. W., Toronto, Ont.....	Arvida and Shawinigan Falls.
Noranda Mines, Limited.....	804 Royal Bank Building, Toronto, Ont.	Rouyn.
ONTARIO		
Deloro Smelting and Refining Co., Limited.....	Deloro.....	Deloro.
International Nickel Co. of Canada, Limited.....	Copper Cliff.....	Coniston, Port Colborne and Copper Cliff.
Kingdon Mining, Smelting and Manufacturing Co., Ltd.	1122 Beaver Hall Hill, Montreal, Que.	Galetta.
Ontario Refining Co., Limited.....	Copper Cliff.....	Copper Cliff.
Falconbridge Nickel Mines, Limited.....	100 Adelaide St., Toronto.....	Falconbridge.
MANITOBA		
Hudson Bay Mining and Smelting Co., Limited....	500 Royal Bank Building, Winnipeg.	Flin Flon.
BRITISH COLUMBIA		
Consolidated Mining and Smelting Company.....	Trail.....	Trail.
Granby Consolidated Mining, Smelting and Power Co., Ltd.	Anyox.....	Anyox.

Silver-Cobalt Mining Industry

Name	Address	Name of Mine	Location of Mine
ONTARIO			
Brocklebank, A.....	Box 929, Cobalt.....	Kerr Lake.....	Coleman Tp.
*Canadian Lorraine Silver Mines.....	1206 Star Building, Toronto...	Canadian Lorraine.....	Lorraine Tp.
Castle Tretheway Mines, Limited.....	Bestel.....	Castle.....	Haultain Tp.
Clemens, E. H.....	Cobalt.....	Coniagas and Trethewey.	Coleman Tp.
Cobalt Contact Mines, Limited.....	8 Bloor St., E. Toronto.....	Cobalt Contact.....	Bucke Tp.
Frontier Lorraine Mines.....	350 Bay St., Toronto.....	Frontier Lorraine.....	South Lorraine Tp.
Hudson Bay Mines, Limited.....	New Liskeard.....	Hudson Bay.....	Cobalt.
Jemmett, D. L., Limited.....	Cobalt.....	Agauico.....	Bucke Tp.
Keeley Silver Mines, Limited.....	1206 Star Building, Toronto 2.	Keeley.....	Lorraine.
Lorraine Trout Lake.....	350 Bay St., Toronto.....	Lorraine Trout Lake...	South Lorraine.
Martin, George.....	Box 659, Cobalt.....	Crown Reserve.....	Coleman Tp.
Mining Corporation of Canada, Limited.....	350 Bay St., Toronto.....	Buffalo, Townsite City, Cobalt Lake.	Cobalt.
Morrison Mines, Limited.....	165 Sparks St., Ottawa.....	Morrison.....	Nicol Tp.
Mosher & McKay.....	Cobalt.....	McKinley-Darragh, Savage.	Cobalt.
Nipissing Mining Company, Limited.....	Excelsior Life Building of Toronto.	Nipissing.....	Cobalt.
O'Brien, M. J., Limited.....	816 Ottawa Electric Building, Ottawa.	O'Brien, Miller Lake O'Brien.	Coleman Tp., Gowganda Mining Division.
Preston, N. N., Taylor, N. D., Cain, C. E.	Box 386, Cobalt.....	Beaver.....	Coleman Tp.
Price, C. W.....	Cobalt.....	Foster.....	Coleman Tp.
Sandoe & Moyle.....	Box 815, Cobalt.....	Temiskaming.....	Coleman Tp.
Silver Cliff Lease.....	Cobalt.....	Silver Cliff.....	Coleman Tp.
Ward, R. G.....	Cobalt.....	Stoneham.....	North Cobalt.

Silver-Lead-Zinc Mining Industry

Name	Address	Name of Mine	Location of Mine
NOVA SCOTIA			
British Metal Corporation (Canada), Limited.	437 St. James St., Montreal, Que.	Stirling.....	Richmond Co.
QUEBEC			
*Federal Zinc & Lead Company, Limited.	Room 602, Drummond Bldg., Montreal.	Federal.....	Lemieux Tp.
*Huronian Mining & Finance Company, Limited.	1206 Star Bldg., Toronto, Ont.	.....	Lemieux Tp.
*Lyall & Beidelman.....	Room 602 Drummond Bldg., Montreal.	.....	Lemieux Tp.
*Northern Aerial Minerals Exploration, Limited.	1406 Concourse Bldg., Toronto, Ont.	.....	Chibougamau Area.
*St. Lawrence Metals, Limited.....	2514 Mount Royal, E., Montreal.	.....	Montauban Tp.
*Tetreault, J. L. A.....	70 Holyrood Ave., Outremont.	Tetreault.....	Montauban Tp.
ONTARIO			
*Gordon Lake Holding Co., Limited....	c/o Dr. A. H. Abbott, Federal Bldg., Toronto.	.....	Creighton and Fairbanks Tps.
*Interprovincial Exploration Co., Limited.	437 St. James St. W., Montreal, Que.	.....	Ben Nevis and McVittie Tps.
Kingdon Mining and Smelting Co., Limited.	1122 Beaver Hall Hill, Montreal, Que.	Kingdon.....	Galetta.
*Lake Geneva Mining Co., Limited....	1108 Dominion Square Bldg., Montreal.	Collins-Babson.....	Hess Tp.
*Metals Development, Limited.....	811 Sterling Tower, Toronto.	Metals.....	Goodall and Dent Tps.
Treadwell Yukon Co., Limited.....	Crocker Bldg., San Francisco, U.S.A.	Errington.....	Sudbury Dist.
BRITISH COLUMBIA			
Ainsworth Mining Division—			
*C. M. & S. Co. of Canada, Limited...	Trail.....	Kootenay Chief.....	Riondel.
Hughes, Ray and Garrett, A. P.	Ainsworth.....	Banker.....	Ainsworth.
*Kootenay Florence Mining Co., Limited.	213 Bank of Nova Scotia Bldg., Vancouver.	Kootenay-Florence.....	Ainsworth.
*Omo Mines Corporation.....	321 Lindelle Bldg., Spokane, Wash., U.S.A.	Riverside Group.....	Howser Lake.
S. N. Ross.....	Retallack, B.C.....	Whitewater.....	Kaslo.
Arrow Lake Mining Division—			
*Cotton Belt Mines, Ltd.....	736 Granville St., Vancouver.	Meadow View.....	Vernon.
*Consolidated Mining and Smelting Co. of Canada, Limited.	Trail.....	Hailstorm.....	Arrow Lake.
Bella Coola Mining Division—			
*Consolidated Mining and Smelting Co. of Canada, Limited.	Trail.....	Nifty Group.....	Bella Coola.
Fort Steele Mining Division—			
Consolidated Mining and Smelting Co. of Canada, Limited.	Trail.....	Sullivan.....	Fort Steele.
Grand Forks Mining Division—			
Lightning Peak Mining Company.....	Trail.....	Lightning Peak.....	Grand Forks.
Boundary-Republic Mines, Ltd.....	414 St. James St. W., Montreal.	Yankee Girl.....	Grand Forks.
Greenwood Mining Division—			
Beaverdell Wellington Syndicate, Limited.	Greenwood.....	Wellington.....	Beaverdell.
Bell Mine, Limited.....	Box 37, Creston.....	Bell.....	Beaverdell.
*Forshaw, Robert.....	Box 517, Greenwood.....	Brooklyn and Sternwinder.	Greenwood.
Henderson, T. T.....	Beaverdell.....	Duncan.....	Wallace Mountain.
Highland Lass, Limited.....	Kelowna.....	Highland Lass and Highlander Fraction.	Beaverdell.
Sally Mines, Limited.....	Box 220, Penticton.....	Sally.....	Wallace Mountain.
Standhope, Philip B. S.....	Beaverdell.....	Bounty.....	Wallace Mountain.
Waterloo Consolidated Mines, Limited	Penticton.....	Waterloo.....	Lightning Peak.
Golden Mining Division—			
Base Metals Mining Corporation, Ltd.	Field.....	Monarch.....	Field.
Galena Syndicate, Limited.....	80 Bishopsgate, London, England.	Ruth-Vermont.....	East Kootenay.
Pacific Mines Pat. & Dev. Co., Limited	744 Hastings St. W., Vancouver	Giant.....	Spillimachene.
*Witwatersrand Syndicate, Limited.	Box 277 Revelstoke.	Witwatersrand.....	East Kootenay.
*Paradise Holdings, Ltd.....	804 Stock Exchange Bldg., Vancouver.	Paradise.....	Invermere.
Kamloops Mining Division—			
*Speedwell Group.....	Box 157, Salmon Arm.....	Speedwell.....	Kamloops Mining Div.
Nanaimo Mining Division—			
*Morton Woolsey Consolidated Mines, Limited.	19 Williams Bldg., Vancouver.	Dorothy Morton.....	Phillips Arm.
Nass River Mining Division—			
*Keystone Mining Co., Limited.....	521 Central Bldg., Seattle, Wash., U.S.A.	Keystone.....	Alice Arm.
*Torbrit Mining Co., Limited.....	Britannia Beach.....	Torbrit.....	Alice Arm.

* Operating but not producing.

Silver-Lead-Zinc Mining Industry—Concluded

Name	Address	Name of Mine	Location of Mine
BRITISH COLUMBIA—Concluded			
<i>Nelson Mining Division—</i>			
Goodenough Mine.....	Ymir.....	Goodenough.....	Ymir.
*Reeves MacDonald Mines, Limited..	804 Stock Exchange Bldg., Vancouver.	Reeves MacDonald.....	Salmo.
<i>Nicola Mining Division—</i>			
Planet Mines and Reduction Co.....	402 Pender St. W., Vancouver.	Planet.....	Stump Lake.
<i>Omineca Mining Division—</i>			
*Cons. Mining and Smelting Co. of Canada, Limited.....	Trail.....	Emerald Mine.....	Omineca Min. Div.
Duthie Mines, Limited.....	702 Pacific Bldg., Vancouver.	Duthie.....	Smithers.
*Ingenika Mines, Limited.....	506 Pacific Bldg., Vancouver.	Ingenika.....	Ingenika River.
<i>Osoyoos Mining Division—</i>			
B. E. Mining Company.....	Leavenworth, Washington, U.S.A.	B. E. Mine.....	Osoyoos Mining Div.
<i>Portland Canal Mining Division—</i>			
*B.C. Silver Mines, Limited.....	702 Pacific Bldg., Hastings St. W., Vancouver.	B.C. Silver.....	Premier.
*Buena Vista Mining Company, Limited.....	Trail.....	Big Missouri.....	Stewart.
Dunwell Mines, Limited.....	Box 1120, Victoria.....	Dunwell.....	Stewart.
<i>Portland Canal Mining Division—Conc.</i>			
Porter Idaho Mining Co., Limited.....	Premier.....	Porter Idaho.....	Portland Canal.
*Premier Border Gold Mining Co., Limited.....	614 Stock Exchange Bldg., Vancouver.	Premier Border.....	Portland Canal.
*Silverado Consolidated, Limited.....	Pemberton Bldg., Victoria.....	Silverado.....	Portland Canal.
<i>Queen Charlotte Islands Mining Division—</i>			
Kitsault-Eagle Silver Mines, Limited	312 Standard Bank Bldg., Vancouver.	Skidegate, Sunrise.....	Skidegate and Graham Island.
<i>Revelstoke Mining Division—</i>			
*Lardeau Mines Exploration, Limited.	410 Seymour St., Vancouver..	.....	Lardeau, Trout Lake, Revelstoke.
Regal Silver Mines, Limited.....	804-510 W. Hastings St., Vancouver.	Regal.....	Albert Canyon.
*Wigwam Mining Company.....	1217 Pacific Ave., Tacoma, Wash., U.S.A.	Wigwam.....	Revelstoke.
<i>Slocan Mining Division—</i>			
Baldwin & Zachman.....	1 Sherman Court, Norwalk, U.S.A.	Mary Ryan.....	Sandon Camp.
*Bluebird Mines, Limited.....	Kaslo.....	Stranger and Idaho.....	Sandon and Retallac.
Campbell, Colin J.....	New Denver.....	Bosun.....	New Denver.
*Carnation Silver Lead Mines, Limited	1115 Vancouver Blk., Vancouver.	Carnation.....	Sandon.
*Cork-Province Mines, Limited.....	Kaslo.....	Cork-Province.....	Slocan Mining Div.
Cunningham Mines, Ltd.....	Alamo.....	Black Colt—Palmita.....	Slocan District.
Galena Farm Consolidated Mines, Limited.....	804 Stock Exchange Bldg., Vancouver.	Galena Farm Consolidated.....	Silverton.
Gormley, G. T.....	Nelson.....	Elkhorn.....	Sandon.
*Leadsmith Mines, Limited.....	Box 1772, Spokane, Wash., U.S.A.	Noonday.....	Sandon.
*Lucky Jim Lead & Zinc Co., Limited	804 Stock Exchange Bldg., Vancouver.	Lucky Jim.....	Zincton.
McDonnell, Derwis & Kirk.....	Silverton.....	Lucky Thought.....	Four Mile Creek.
*Minnesota Silver Co., Limited.....	Suite 2750, 450 Lexington Ave., New York, U.S.A.	Ivahoe.....	Sandon.
Noble Five Mines, Limited.....	Nelson.....	Noble Five.....	Sandon.
Ruth Hope Mining Co., Limited.....	901 Vancouver Blk., Vancouver	Ruth Hope.....	West Kootenay Dist.
Silversmith Mines, Limited.....	Sandon.....	Silversmith.....	Sandon.
Slocan King Mines, Limited.....	Sandon.....	Hidden Treasure, Slocan King.....	Sandon.
*Stewart, R. H.....	736 Granville St., Vancouver.	Canadian Brandon.....	Sandon.
Western Exploration Co., Limited.....	Silverton.....	Standard.....	Silverton.
Whitewater Mines, Limited.....	Kaslo.....	Whitewater.....	Retallack.
Zimmerman, Miss Vallia.....	Slocan.....	Treasure Chest.....	.....
<i>Trail Creek Mining Division—</i>			
Schmidt, John & M. Penny.....	Rossland.....	Gold Dip and Gold Bug.....	Trail Creek Mining Div.
<i>Trout Lake Mining Division—</i>			
*Spyglass-McLeod Mining Co.....	Victoria.....	Spyglass.....	Trout Lake Mining Div.
<i>Vernon Mining Division—</i>			
*St. Paul Mines, Limited.....	90 Dr. Van Etter, 720 Columbia St., New Westminster.	St. Paul.....	Lumby.
<i>Victoria Mining Division—</i>			
*El Capitan Syndicate.....	Box 354, Duncan.....	El Capitan.....	Victoria.
<i>Yale Mining Division—</i>			
Silver King Mining Company.....	Tulameen.....	Mary E.....	Yale.
YUKON			
Bjornnes, Ellef.....	Keno.....	No Cash.....	Galena Hill.
McKay, Thomas.....	Keno.....	Shamrock.....	Mayo Mining Dist.
McLean, Daniel & John McHugh.....	Keno.....	Silver King.....	Galena Hill.
Treadwell Yukon Company, Limited..	Crocker Bldg., San Francisco, U.S.A.	Werneck.....	Mayo Mining Dist.

Tungsten Mining Industry

NOVA SCOTIA			
*Indian Path Mines, Limited.....	464 Barrington St., Halifax...	Indian Path.....	Lunenburg.
*Heyd, T. M.....	Box 484, Halifax.....	Romilly Scheelite.....	Waverley.

NON-METAL MINING INDUSTRIES INCLUDING FUELS

FUELS

Coal Mining Industry*

Name	Address	Location
NOVA SCOTIA—		<i>District</i>
Acadia Coal Co., Ltd.....	Stellarton.....	Pictou.
Bras d'Or Coal Co.....	Little Bras d'Or Bridge.....	Cape Breton.
Cumberland Railway and Coal Co.....	Springhill.....	Cumberland.
Dominion Coal Co., Ltd.....	Glace Bay.....	Cape Breton.
Greenwood Coal Co., Ltd.....	New Glasgow.....	Pictou.
Indian Cove Coal Co., Ltd.....	Sydney Mines.....	Cape Breton.
Intercolonial Coal Co., Ltd.....	Westville.....	Pictou.
Inverness Railway and Coal Co.....	Inverness.....	Inverness.
Maritime Coal, Railway and Power Co., Ltd.....	Joggins Mines.....	Cumberland.
North Sydney Collieries, Ltd.....	North Sydney.....	Cape Breton.
Nova Scotia Steel and Coal Co.....	Sydney Mines.....	Cape Breton.
Victoria Coal Co., Ltd., (operating No. 2 Mine Minudie Coal Co.).....	New Glasgow.....	Cumberland.
NEW BRUNSWICK—		
Avon Coal Co., Ltd.....	St. John.....	Queens.
Colter, A. A. (formerly Chipman Coal Co.).....	Fredericton.....	Queens.
Evans, W. B.....	Minto.....	Queens.
Minto Coal Co., Ltd.....	St. John.....	Queens.
Miramichi Lumber Co., Ltd.....	Minto.....	Queens.
Welton, Harvey.....	Minto.....	Queens.
Welton and Henderson, Ltd.....	Minto.....	Queens.
SASKATCHEWAN—		
Bienfait Mine.....	Bienfait.....	Near Bienfait.
Bourgouin, Louis.....	Estevan, Box 287.....	Near Estevan.
Crescent Collieries, Ltd.....	Bienfait.....	Near Bienfait.
Eastern Collieries of Bienfait, Ltd.....	Estevan.....	Near Estevan.
Gill, William (formerly W. H. Rollinson).....	Box 65, Estevan.....	Estevan.
International Clay Products, Ltd.....	Estevan.....	Near Estevan.
Manitoba and Saskatchewan Coal Co., Ltd.....	503 Avenue Block, Winnipeg, Man.....	Bienfait.
National Mines Ltd. (formerly Bienfait Commercial Co.).....	Bienfait.....	Near Bienfait.
Nicholson, H.....	Estevan.....	Estevan.
Shand Coal and Brick Co.....	Shand.....	Shand.
Truax Traer Coal Co., Ltd.....	Estevan.....	Near Estevan.
Western Dominion Collieries, Ltd.....	305 Trust and Loan Bldg., Winnipeg, Man.....	Taylorlton.
ALBERTA—		
<i>Bituminous—</i>		
Brazeau Collieries, Ltd.....	Nordegg.....	Nordegg.
Cadomin Coal Co., Ltd.....	Cadomin.....	Mountain Park.
Canmore Coal Co., Ltd.....	Canmore.....	Cascade.
Cartwright & Thomason (formerly Sunburst Coal Co.).....	Blairmore.....	Crowsnest.
Hillcrest Collieries, Ltd.....	Hillcrest.....	Crowsnest.
International Coal and Coke Co., Ltd.....	Coleman.....	Crowsnest.
Luscar Collieries, Ltd.....	Edmonton.....	Mountain Park.
McGillvray Creek Coal and Coke Co., Ltd.....	Coleman.....	Crowsnest.
Mohawk Bituminous Mines, Ltd.....	Calgary.....	Crowsnest.
Mountain Park Collieries, Ltd.....	410 Tegler Bldg., Edmonton.....	Mountain Park.
West Canadian Collieries, Ltd.....	Blairmore.....	Crowsnest.
<i>Sub Bituminous—</i>		
Alexo Coal Co., Ltd.....	Alexo.....	Saunders.
Bighorn and Saunders Creek Collieries, Ltd.....	Saunders.....	Saunders.
Bryan Coal Co., Ltd.....	Adams Bldg., Edmonton.....	Coalspur.
Coal Valley Mining Co., Ltd.....	Coal Valley.....	Coalspur.
Foothills Collieries, Ltd.....	Foothills.....	Coalspur.
Jasper Coal Co., Ltd.....	Edmonton.....	Prairie Creek.
Lakeside Coal Co., Ltd. (formerly Balkan Coal Co., Ltd.).....	Edmonton.....	Coalspur.
McLeod River Collieries (formerly Saunders Ridge Coal Co., Ltd.).....	Mercoal.....	Coalspur.
Sterling Collieries, Ltd.....	Edmonton.....	Coalspur.
Superba Coal Co., Ltd.....	Lovett.....	Coalspur.
Val D'or Collieries Ltd.....	Reco.....	Coalspur.

* Operators producing an average of 500 tons or over per month.

Coal Mining Industry*

Name	Address	Location
ALBERTA—Concluded		
<i>Lignite—</i>		
Aetna Coal Co., Ltd.	Drumheller.	Drumheller.
Alberta Block Coal Co., Ltd.	Drumheller.	Drumheller.
Anderson, W. J.	Sheerness.	Sheerness.
Atlas Coal Co., Ltd.	East Coulee.	Drumheller.
Big Valley Collieries, Ltd.	Big Valley.	Big Valley.
Bow River Syndicate.	Grassy Lake.	Taber.
Bush Mines, Ltd.	1024-101A Avenue, Edmonton.	Edmonton.
Cadillac Coal Co., Ltd. (formerly Donaldson, C. S., Coal Co.).	Suite 1, Hill Block, Lethbridge.	Lethbridge.
Canadian Dinant Coal Co.	Dinant.	Camrose.
Canadian Pacific Railway Co.	Department of Natural Resources Calgary.	Lethbridge.
City of Lethbridge Coal Mines.	Lethbridge.	Lethbridge.
Coal Producers, Ltd.	Calgary.	Pembina and Lethbridge.
Consolidated Diamond Collieries, Ltd.	Lethbridge.	Lethbridge.
Dawson Coal Co., Ltd.	7 McDougall Court, Edmonton.	Edmonton.
Dobell Coal Co., Ltd.	Tofield.	Tofield.
Drumheller Consolidated Collieries, Ltd.	Calgary.	Drumheller.
Elgin Coal Co., Ltd.	Drumheller.	Drumheller.
Ellis Coal Co., Ltd.	Three Hills.	Carbon.
Empire Collieries, Ltd.	East Coulee.	Drumheller.
Excelsior Collieries, Ltd.	Wayne.	Drumheller.
Fox Coal Co.	Carbon.	Carbon.
Fraser MacKay Collieries, Ltd.	10055—101st. St., Edmonton.	Edmonton.
Gibb, W. E. (formerly Rabbit Hill Collieries Ltd.)	Strathcona.	Edmonton.
Great West Coal Co., Ltd. (Black Diamond Mine)	11026—101st St., Edmonton.	Edmonton.
Great West Coal Co., Ltd. (Star Mines).	Aerial.	Drumheller.
Hy-Grade Coal Co.	Drumheller.	Drumheller.
Ideal Coal Co., Ltd.	Wayne.	Drumheller.
Jewel Collieries, Ltd.	Wayne.	Drumheller.
Keith and Fulton Coal Co., Ltd.	Edmonton.	Edmonton.
Kleenbirt Collieries, Ltd.	Eyremore.	Brooks.
Lakeside Coals, Ltd.	711 Tegler Bldg., Edmonton.	Pembina.
Maple Leaf Minerals, Ltd.	Drumheller.	Drumheller.
Marcus Coal Mines, Ltd.	10366—104th. St., Edmonton.	Edmonton.
Middleton Collieries, Ltd.	Calgary.	Drumheller.
Midland Coal Mining Co., Ltd.	Midlandvale.	Drumheller.
Minute Mine.	Drumheller.	Drumheller.
Monogram Coal Co.	Rosedale.	Drumheller.
Murray Collieries, Ltd.	Drumheller.	Drumheller.
Newcastle Coal Co., Ltd.	Drumheller.	Drumheller.
Newcastle Junior Mining Co.	Drumheller.	Drumheller.
Oliphant, J. H.	Carbon.	Carbon and Redcliff.
Oliver, E.	Taber.	Taber.
Ontalta Collieries, Ltd.	Rosedale Station, Drumheller.	Drumheller.
Ottewell Coal Co.	Clover Bar.	Edmonton.
Palisade Coal Co., Ltd. (formerly Palisade Collieries, Ltd.)	Three Hills.	Carbon.
Parker, L. (formerly Sun Coal Co., Ltd.)	Cardiff.	Edmonton.
Peerless Carbon Collieries, Ltd.	Carbon.	Carbon.
Penn Coals, Ltd. (formerly Sturgeon Collieries Ltd.)	Edmonton.	Edmonton.
Penn Mines, Ltd.	Fraser Flats, Edmonton.	Edmonton.
Premier Coal Co., Ltd.	109th Avenue, Edmonton.	Edmonton.
Redcliff Brick and Coal Co., Ltd.	Redcliff.	Redcliff.
Rosedale Coal Co., Ltd.	Rosedale.	Drumheller.
Rose Deer Coal Mining Co., Ltd.	Wayne.	Drumheller.
Royal Lethbridge Collieries.	Box 5, Lethbridge.	Lethbridge.
Sinoski, M.	Strathcona.	Edmonton.
Sovereign Coal Mining Co., Ltd.	Wayne.	Drumheller.
Stoney Creek Collieries, Ltd.	Camrose.	Camrose.
Superior Grade Coal Co., Ltd.	Wayne.	Drumheller.
Thomas, J. D., Coal Co., Ltd.	Nacmine.	Drumheller.
Tofield Coal Co., Ltd.	Tofield.	Tofield.
Triangle Coal Co. (formerly Leech & Milne).	Drumheller.	Drumheller.
Warneboldt, Julius.	Sheerness.	Sheerness.
Watson and Ross (formerly Big Valley Power & Mining Co., Ltd.)	Big Valley.	Big Valley.
Western Gem Coal Co., Ltd.	Drumheller.	Drumheller.
BRITISH COLUMBIA—		
Blue Flame Colliery (formerly Lynden Coal Mines, Ltd.)	Coalmont.	Inland.
Canadian Collieries (Dunsmuir) Ltd.	Nanaimo.	Island.
Chambers, R. H. (Little Ash Mine)	Nanaimo.	Island.
Coalmont Collieries, Ltd.	Coalmont.	Inland.
Corbin Collieries, Ltd.	Corbin.	Crow's Nest Pass.
Crow's Nest Pass Coal Co., Ltd.	Fernie.	Crow's Nest Pass.
East Wellington Coal Co.	Belmont House Victoria.	Island.
Granby Consolidated Mining, Smelting and Power Co., Ltd.	Cassidy.	Island.
Middlesboro Collieries, Ltd.	Merritt.	Inland.
Pleasant Valley Mining Co., Ltd.	Princeton.	Inland.
Tulameen Coal Mines, Ltd.	Princeton.	Inland.
Western Fuel Corporation of Canada, Ltd.	Nanaimo.	Island.

*Operators producing an average of 500 tons or over per month.

Natural Gas Industry

Name	Address	Location
<i>Field</i>		
NEW BRUNSWICK— New Brunswick Gas and Oilfields, Ltd.	Box 196, Moncton.....	Stoney Creek, Albert Co.
<i>Field</i>		
ONTARIO— Acme Gas and Oil Co., Ltd.	602 Atlas Bldg. Toronto.....	Middleton.
Ajax Oil and Gas Co., Ltd.	1212 Star Bldg., Toronto.....	Dover W. and Tuscarora.
Allen, J. D.	Lowbanks.....	Moulton.
Beer, Geo.	Binbrook.....	Binbrook.
Benn, A. S.	Hagersville.....	Walpole.
Binbrook Village Gas Co.	Binbrook.....	Binbrook.
Border Cities Syndicate.....	47 Elgin St., Brantford.....	Onondaga.
Canada Cement Co., Ltd.	Box 290 Montreal, P.Q.	Wainfleet.
Canboro Gas and Oil Co., Ltd.	Cayuga.....	Canboro, Cayuga N. and Seneca.
Canby, B. F.	R. R. No. 2, Wainfleet.....	Wainfleet.
Canfield Natural Gas Co., Ltd.	Canfield.....	Cayuga N.
Central Pipe Line Co., Ltd.	Chatham.....	Bayham, Houghton, Middleton.
Chippawa Development Co., Ltd.	Chippawa.....	Willoughby.
Cliff Gas Co., Ltd.	Rochester, N.Y.	Canboro and Moulton.
Coleman, J. A.	Wellandport.....	Gainsboro and Wainfleet.
Dominion Natural Gas Co., Ltd.	518 Jackson Bldg., Buffalo, N.Y., U.S.A.	Binbrook, Bayham, Canboro, Caistor, Charlotteville, Ca- yuga N., Cayuga S., Dunn, Glanford, Houghton, Humber- stone, Middleton, Malahide, Moulton, Onondaga, Oneida, Rainham, Seneca, Townsend, Wainfleet, Walpole, Walsing- ham S., Walsingham N., Windham, Woodhouse.
Dunn Natural Gas Co., Ltd.	Dunnville.....	Dunn and Sherbrooke.
Eastside Gas Co.	R. R. 2, Lowbanks.....	Sherbrooke.
Ellsworth, F.	Box 391, Pt. Colborne.....	Wainfleet.
Enterprise Gas Co.	R. R. No. 3, Cayuga.....	Rainham.
Erie Gas and Oil Syndicate.....	Fisherville.....	Rainham.
Fisherville Gas Co.	Fisherville.....	Rainham.
Fisherville Gas Co., No. 2.....	Fisherville.....	Rainham.
Fletcher, J. D.	R. R. 1, Hannon.....	Binbrook.
Gifford, Arthur and Son.....	R. R. 2, Cayuga.....	S. Cayuga.
Grimsby Natural Gas Co., Ltd.	Ridgway, Pa., U.S.A.	Caistor and Gainsboro.
Haldimand Gas Fields Ltd.	Cayuga.....	Cayuga N. and Rainham.
Hart and Harrington.....	Dunnville.....	Canboro.
Held, Fred.	Fisherville.....	Rainham.
Highbank Oil Ltd.	Chatham.....	Raleigh.
Hill, A. W.	Coatsworth.....	Tilbury E.
Huffman, Albert.....	R. R. 2, Dunnville.....	Moulton.
Industrial Natural Gas Co., Ltd.	Port Robinson.....	Bertie, Crowland, Humberstone, and Willoughby.
Jasperson, B.	Kingsville.....	Gosfield South and Romney.
Jones, J. S.	Port Maitland.....	Dunn.
Kindy, D. and Sons.....	Selkirk.....	Rainham.
Lincoln Gas Co., Ltd.	Grimsby.....	Caistor, Canboro and Gainsboro
Michener, E. L.	Wainfleet.....	Wainfleet.
Midfield Natural Gas Co., Ltd.	Hamilton.....	N. Cayuga and Oneida.
Nelles Corners Gas Syndicate.....	Nelles Corners.....	Cayuga N. and Rainham.
Niece, Hosea and Son.....	R. R. 2, Lowbanks.....	Sherbrooke.
Northern Gas and Gasoline Co.	Hepworth.....	Amabel.
North Shore Gas Co., Ltd.	Selkirk.....	Rainham.
Oil Springs Oil and Gas Co., Ltd.	Oil Springs.....	Enniskillen.
Ontario Salt Co., Ltd.	Hamilton.....	Dorchester N.
Patterson, W. C.	Jamestown, N.Y., U.S.A.	Cayuga N., Cayuga S. and Dunn.
Petrol Oil and Gas Co., Ltd.	307 York Bldg., Toronto.....	West Dover and Tuscarora.
Port Colborne-Welland Natural Gas and Oil Co. Ltd.	Port Colborne.....	Oneida, Onondaga and Seneca.
Provincial Natural Gas and Fuel Co., of Ontario Ltd.	Bridgeburg.....	Bertie, Crowland, Humberstone and Willoughby.
Rainham Gas and Oil Syndicate.....	Fisherville.....	Rainham.
Sarnia Gas and Oil Co.	Sarnia.....	Sarnia.
Seneca Gas Syndicate.....	Dunnville.....	Dunn and Seneca.
Smith, R. H.	Lowbanks.....	Moulton.
Smith's Oil and Gas Syndicate.....	Windsor.....	Romey.
South Cayuga Gas Syndicate.....	R. R. 2, Cayuga.....	Cayuga S.
Southern Ontario Gas Co., Ltd.	518 Jackson Bldg., Buffalo, N.Y., U.S.A.	Mersa, Mosa, Raleigh, Rom- ney and Tilbury East.
South Sarnia Properties, Ltd.	Sarnia.....	Sarnia.
Springvale Gas and Oil Co., Ltd.	Hagersville.....	Walpole.
Stevensville Natural Gas and Fuel Co.	Stevensville.....	Bertie.
Stoney Creek Gas and Oil Syndicate.....	Selkirk.....	Rainham.
Sundry Gas Well Co.	Dunnville.....	Canboro.
Union Natural Gas Co. of Canada, Ltd.	52 Fifth St., Chatham.....	Dawn, Dover, Euphemia, Ral- eigh, Romney and Tilbury E.
Vacuum Gas and Oil Co., Ltd.	905 Atlas Bldg., Toronto.....	Middleton.
Van Sickle, A. W.	Onondaga.....	Onondaga.
Wainfleet-Moulton Gas Co.	R. R. 1, Lowbanks.....	Moulton and Wainfleet.

Natural Gas Industry—Concluded

Name	Address	Location
MANITOBA—		
Bosc, François.....	Rathwell.....	Rathwell.
Clement, F.....	Waskada.....	Waskada.
Haskill, E. C.....	Box 64, Treherne.....	Treherne.
ALBERTA—		
Advance Oil Co.....	606-2nd St. W., Calgary.....	Turner Valley.
Alberta Clay Products Co., Ltd.....	Box 672, Medicine Hat.....	Medicine Hat.
Associated Oil and Gas Co., Ltd.....	Calgary.....	Turner Valley.
Baltac Oils Ltd.....	200 Leeson-Lineham Block, Calgary.....	Turner Valley.
Bow Island Gas Plant.....	Bow Island.....	Bow Island.
British Dominion Oil and Development Corp., Ltd.....	211 Dominion Bank Bldg., Calgary.....	Turner Valley.
Canadian Pacific Railway Co.....	Montreal, P.Q.....	Medicine Hat.
Canadian Western Natural Gas, Light, Heat and Power Co., Ltd.....	215-6th Ave. W., Calgary.....	Bow Island, Brooks, Foremost and Turner Valley.
Canadian Western Power and Fuel Co., Ltd.....	Redcliff.....	Redcliff.
Dalhousie Oil Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
Dominion Glass Co., Ltd.....	1111 Beaver Hall Hill, Montreal, P.Q.....	Redcliff.
East Crest Oil Co., Ltd.....	231-8th Ave. W., Calgary.....	Turner Valley.
Foothills Oil and Gas Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
Higgins, Estate of.....	Suffield.....	Suffield.
Home Oil Co., Ltd.....	535 Georgia St., W., Vancouver, B.C.....	Turner Valley.
Hudson's Bay Oil and Gas Co., Ltd.....	407 Herald Bldg., Calgary.....	Viking.
Lowery Petroleums, Ltd.....	88 King St. E., Toronto, Ont.....	Turner Valley.
Maple Leaf Oil Co., Ltd.....	1007 Stock Exchange Bldg., Vancouver, B.C.....	Fabyan.
Maple Leaf Milling Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Mayland Oil Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
McLeod Oil Co., Ltd.....	507 Grain Exchange, Calgary.....	Turner Valley.
Medicine Hat Brick and Tile Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Medicine Hat, Corporation of.....	Medicine Hat.....	Medicine Hat.
New Illinois-Alberta Oils, Ltd.....	211 Lancaster Bldg., Calgary.....	Turner Valley.
New McDougall-Segur Oil Co., Ltd.....	38 Union Bldg., Calgary.....	Turner Valley.
Northwestern Utilities, Ltd.....	10124-104th St., Edmonton.....	Viking.
Ogilvie Flour Mills, Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Range Oil and Gas Co., Ltd.....	68 Canada Life Bldg., Calgary.....	Border.
Redcliff Brick and Coal Co., Ltd.....	Box B 5, Redcliff.....	Redcliff.
Royalite Oil Co., Ltd.....	606-2nd St. W., Calgary.....	Turner Valley.
Spooner Oils, Ltd.....	Bank of Commerce Chambers, Calgary.....	Turner Valley.
Sterling Pacific Oil Co., Ltd.....	Vancouver, B.C.....	Turner Valley.
United Natural Gas Development Co., Ltd.....	200-203 Leeson-Lineham Bldg., Calgary.....	Foremost.
Vanalta Oils Ltd.....	501 Province Bldg., Vancouver, B.C.....	Red Coulee.
Wetaskiwin, Corporation of.....	Wetaskiwin.....	Wetaskiwin.
Wainwright Gas Co., Ltd.....	36 Dominion Bank Bldg., Edmonton.....	(Distributing Company).

PETROLEUM INDUSTRY

NEW BRUNSWICK—		
New Brunswick Gas and Oilfields, Ltd.....	Box 196, Moncton.....	Stoney Creek, Albert Co.
ONTARIO—		
Acme Oil and Gas Co., Ltd.....	602 Atlas Bldg., Toronto.....	Bothwell.
Ajax Oil and Gas Co., Ltd.....	85 Richmond St., W., Toronto.....	Thamesville.
Anderson Bros. and Thompson.....	Oil Springs.....	Oil Springs.
Anderson, J. H.....	Oil Springs.....	Oil Springs.
Armstrong, J. E., Estate.....	Petrolia.....	Petrolia and Enniskillen.
Baker, Jas.....	R. R. 3, Petrolia.....	Petrolia and Enniskillen.
Barrett, C. H.....	Petrolia.....	Petrolia and Enniskillen.
Bowles, Herbert.....	Petrolia.....	Sarnia.
Bradley, R. N.....	Lowbanks.....	Petrolia and Enniskillen.
Braybrook, J. T.....	Petrolia.....	Petrolia and Enniskillen.
Brock, T. A.....	Petrolia.....	Petrolia and Enniskillen.
Byers, Lydia.....	Oil Springs.....	Oil Springs.
Canadian Oil Refineries, Ltd.....	12 Strachan Ave., Toronto.....	Petrolia and Enniskillen.
Carleton, W. G.....	R.R. 2, Petrolia.....	Petrolia and Enniskillen.
Carman and Fairbank.....	Petrolia.....	Bothwell.
Chesher, Geo.....	Petrolia.....	Sarnia.
Colchester Oil Co.....	Toronto.....	Thamesville.
Cole, W. J.....	Petrolia.....	Petrolia and Enniskillen.
Collins, Thos.....	Petrolia.....	Petrolia and Enniskillen.
Copeland, John.....	Petrolia.....	Petrolia and Enniskillen.
Crocker-Farks Oil Co., Ltd.....	Oil Springs.....	Oil Springs.
Crotty and Elliot.....	Bothwell.....	Bothwell.
Dennis, C.....	Oil Springs.....	Oil Springs.
Dennis, E.....	Petrolia.....	Plympton.
Dominion Petroleum Co., Ltd.....	Glencoe.....	Mosa.
Donald, Geo.....	Oil Springs.....	Oil Springs.
Drope, Geo.....	R.R. 4, Copelston.....	Petrolia and Enniskillen.

Petroleum—Continued

Name	Address	Location
ONTARIO—Concluded		
Duncan, Bros.	R.R. 3, Petrolia.	Moore.
Edward, F. H.	Box 125, Petrolia.	Petrolia and Enniskillen.
Elliot, C. H.	R.R. 3, Petrolia.	Sarnia.
Elliot, K. G.	R.R. 2, Sarnia.	Petrolia and Enniskillen.
Elliot, Henry	Petrolia.	Moore.
Ewart, Jas.	R.R. 1, Wyoming.	Plympton.
Fairbank, C. O., Estate	Petrolia.	Oil Springs.
Fairbank, J. H., Estate	Petrolia.	Oil Springs.
Forsythe, A.	Copelston.	Petrolia and Enniskillen.
Gillespie, Wm.	Petrolia.	Petrolia and Enniskillen.
Goudie, John.	Petrolia.	Petrolia and Enniskillen.
Gregory, Henry.	Petrolia.	Petrolia and Enniskillen.
Griffin, Geo. B.	R.R. 1, Sarnia.	Sarnia.
Halliday, Henry.	R.R. 2, Sarnia.	Sarnia.
Hamlin, F. G.	Petrolia.	Petrolia and Enniskillen.
Hardy, Chas.	R.R. 2, Sarnia.	Sarnia.
Hastie, Wm.	R.R. 2, Sarnia.	Sarnia.
Heal, John.	Petrolia.	Moore.
Hillis, T. J. and Sons.	Oil Springs.	Oil Springs.
Houston, Mrs. Annie.	Petrolia.	Petrolia and Enniskillen.
Howlett, Fred and Sons, Ltd.	Petrolia.	Petrolia and Enniskillen.
Jasperson, B.	Kingsville.	Tilbury East.
Jewell, Dan.	Oil Springs.	Oil Springs.
Johns, Wm.	Wyoming.	Plympton.
Josh, Thos.	Petrolia.	Petrolia and Enniskillen.
Kelly, J. E.	Box, 706, Petrolia.	Petrolia and Enniskillen.
Kerr, John Estate.	Petrolia.	Petrolia and Enniskillen.
Kerr, Mrs. Ross.	Sarnia.	Petrolia and Enniskillen.
Kirk, Elmer.	Petrolia.	Moore.
Levine, H.	Petrolia.	Petrolia and Enniskillen.
Lewis, J. J., Estate.	Oil Springs.	Oil Springs.
Logan, Herbert.	Petrolia.	Sarnia.
Loxton, Thos.	Petrolia.	Petrolia and Enniskillen.
Maw, F. W.	Petrolia.	Petrolia and Enniskillen.
McAlpine, T. A.	R.R. 3, Petrolia.	Petrolia and Enniskillen.
McColl, Ed.	Petrolia.	Petrolia and Enniskillen.
McGaffey, Richard.	Bothwell.	Bothwell.
McGill, Joseph.	Petrolia.	Bothwell and Dutton.
McGillivray, Geo. A.	201 Mt. Pleasant Ave., London.	Oil Springs.
McKay, John.	Sarnia.	Sarnia.
McLean, L.	Newbury.	Mosa.
McLellan, Jas.	R.R. 3, Petrolia.	Moore.
McManus, Alex.	Wyoming.	Moore.
McNaughton, J. D.	R.R. 2, Newbury.	Mosa.
McRitchie, C. A.	Bothwell.	Bothwell.
Mitchell, Charles.	Oil Springs.	Oil Springs.
Mitchell, Wesley.	Sarnia.	Sarnia.
Miller, F. J.	R.R. 2, Sarnia.	Sarnia.
Miller, G. E.	R.R. 3, Petrolia.	Moore.
Mills, A. J.	Corunna.	Sarnia.
Morningstar and Jackson.	Oil Springs.	Oil Springs.
Morningstar, L. H.	Oil Springs.	Oil Springs.
Morris, Geo.	Petrolia.	Petrolia and Enniskillen.
Mott, Ed. J.	Oil Springs.	Oil Springs.
Mott and Mitchell.	Oil Springs.	Oil Springs.
Mutual Oil Producing Co.	195 Dundas St., London.	Petrolia and Enniskillen.
Napper, Fred.	Petrolia.	Petrolia and Enniskillen.
Ontario Lands and Oil Co., Ltd.	Petrolia.	Petrolia and Enniskillen.
Osborne Oil Producers.	Box 700, Petrolia.	Moore.
Owens, R. H.	Chatham.	Petrolia and Enniskillen.
Parks, Mrs. E. M.	R.R. 3, Petrolia.	Petrolia and Enniskillen.
Portsmouth, T.	Petrolia.	Petrolia and Enniskillen.
Petrol Oil and Gas Co., Ltd.	307 York Bldg., Toronto.	Dover W.
Rainsberry, N. J.	Petrolia.	Sarnia.
Rainsberry, Walter.	Petrolia.	Petrolia and Enniskillen.
Rawson, A.	Petrolia.	Petrolia and Enniskillen.
Rawson, Wallace.	R.R. 3, Petrolia.	Petrolia and Enniskillen.
Richardson, Geo.	Wyoming.	Plympton.
Ruckle, H.	Petrolia.	Sarnia.
Sproule Bros.	Oil Springs.	Oil Springs.
Stevenson, G. L.	Petrolia.	Petrolia and Enniskillen.
Stonehouse Bros.	Petrolia.	Moore.
Summit Oil Co.	610 Union Trust Bldg., Rochester, N.Y., U.S.A.	Bothwell.
Tuer, J. T.	Wyoming.	Plympton.
Wallen, Alex, C.	Oil Springs.	Oil Springs.
Wallen, John Estate.	Oil Springs.	Oil Springs.
Wallen and Wallen Estate.	Oil Springs.	Oil Springs.
Walsh, T.	Petrolia.	Petrolia and Enniskillen.
Warwick, Joseph.	Oil Springs.	Oil Springs.
Watt, R. J.	London.	Petrolia and Enniskillen.
Winnett, J. W. G.	Bothwell.	Bothwell.
Woodward, John.	Oil Springs.	Oil Springs.
Woodward, Wm.	Oil Springs.	Oil Springs.
Yerks, Carl.	Petrolia.	Petrolia and Enniskillen.
Young, W. E.	Wyoming.	Plympton.

Petroleum Industry

Name	Address	Location
MANITOBA—		
Drilling—		
Commonwealth Petroleum Ltd.	410 Lancaster Bldg., Calgary, Alberta	Manitou.
Dauphin Oil Syndicate Ltd.	710 Seymour St., Vancouver, B.C.	Dauphin.
SASKATCHEWAN—		
Drilling—		
Citizens Oil & Gas Co., Ltd.	Saskatoon.	Unity Valley.
Simpson Oil Co., Ltd.	Simpson.	Simpson.
Unity Valley Oil Co., Ltd.	207 Lancaster Bldg., Calgary, Alberta.	Unity Valley.
ALBERTA—		
Producing—		
Advance Oil Co., Ltd.*	606-2nd St. W., Calgary.	Turner Valley.
Albertan Federated Oils Ltd.*	Albertan Bldg., Calgary.	Turner Valley.
Alberta Pacific Consolidated Oils Ltd.*	315 Toronto General Trusts Bldg., Calgary.	Red Coulee and Turner Valley.
Associated Oil & Gas Co., Ltd.*	362 Main St., Winnipeg, Man.	Turner Valley.
Associated Refineries Ltd.	Saskatoon, Sask.	Wainwright.
Baltac Oils, Ltd.	200 Leeson-Lineham Block, Calgary	Turner Valley.
British Dominion Oil & Development Corp. Ltd.*	211 Dominion Bank Bldg., Calgary.	Turner Valley.
Calmont Oils Ltd.*	201 Toronto General Trusts Bldg., Calgary.	Turner Valley.
Dalhousie Oil Co., Ltd.*	606-2nd St. W., Calgary.	Turner Valley.
Devenish Petroleum Ltd.*	300 Leeson-Lineham Bldg., Calgary.	Skiff.
East Crest Oil Co., Ltd.*	231-8th Ave. W., Calgary.	Turner Valley.
Foothills Oil & Gas Co., Ltd.*	606-2nd St. W., Calgary.	Turner Valley.
Freehold Oil Corp., Ltd.*	814 Lancaster Bldg., Calgary.	Turner Valley.
Fuego Oil Co., Ltd.	Oyen.	Fuego.
Hargal Oils Ltd.	1007 Stock Exchange Bldg., Vancouver, B.C.	Turner Valley & Wainwright.
Home Oil Co., Ltd.*	535 Georgia St. W., Vancouver, B.C.	Turner Valley.
Homestead Oils Ltd.*	303 Beveridge Bldg., Calgary.	Turner Valley.
Lowery Petroleum Ltd.*	88 King St. E., Toronto, Ont.	Turner Valley.
McLeod Oil Co., Ltd.*	570 Grain Exchange Bldg., Calgary.	Turner Valley.
Mayland Oil Co., Ltd.*	606-2nd St. W., Calgary.	Turner Valley.
Mercury Oils Ltd.*	300 Lancaster Bldg., Calgary.	Turner Valley.
Merland Oil Co. of Canada, Ltd.	134 King St., E., Toronto, Ont.	Turner Valley.
Midfield Oil Co., Ltd.	Turner Valley.	Turner Valley.
Mill City Petroleum, Ltd.*	229-5th Ave. W., Calgary.	Turner Valley.
Miracle Oils Ltd.*	300 Lancaster Bldg., Calgary.	Turner Valley.
Model Oils Ltd.*	7 Cameron Block, Calgary.	Turner Valley.
New Illinois-Alberta Oils Ltd.	211 Lancaster Bldg., Calgary.	Turner Valley.
New McDougall-Segur Oil Co. Ltd.*	38 Union Bldg., Calgary.	Turner Valley.
Okalta Oils Ltd.	1015 Herald Bldg., Calgary.	Turner Valley.
Pensinular Petroleum Ltd.	Wainwright.	Wainwright.
Regent Oil Co., Ltd.*	Calgary.	Turner Valley.
Ribstone Oils Ltd.*	Canada Life Bldg., Calgary.	Ribstone.
Royalite Oil Co., Ltd.*	606-2nd St. W., Calgary.	Turner Valley.
Sasko-Wainwright Oil & Gas Co., Ltd.	214 Canada Life Bldg., Saskatoon, Sask.	Wainwright.
Sioux City Oils Ltd.	410 McLean Block, Calgary.	Turner Valley.
Southwest Petroleum Co., Ltd.*	88 King St. E., Toronto, Ont.	Turner Valley.
Spooner Oils, Ltd.*	Bank of Commerce Chambers, Calgary.	Turner Valley.
Sterling Pacific Oil Co. Ltd.*	555 Burrard St., Vancouver, B.C.	Turner Valley.
United Oils Ltd.	200-203 Leeson-Lineham Block, Calgary.	Turner Valley.
Vanalta Oils Ltd.*	501 Province Bldg., Vancouver, B.C.	Red Coulee.
Vulcan Oils Ltd.	Vulcan.	Turner Valley.
Wellington Oil & Gas Co., Ltd.	4 Central Bldg., Calgary.	Turner Valley.
Widney Oils Ltd.*	201 Lancaster Bldg., Calgary.	Turner Valley.
Drilling only—		
Alberta Gas and Fuel Co., Ltd.	Pincher Creek.	Champion.
Anaconda Oil Co., Ltd.	205 Traders Bldg., Calgary.	Turner Valley.
Angus Oils Ltd.	Albertan Bldg., Calgary.	Waite Valley.
Banner Oils Ltd.	521-22 Burns Bldg., Calgary.	Highwood.
Bethvain Oils Ltd.	23 Toronto St., Toronto, Ont.	Wainwright.
Brock Petroleum Ltd.	31 Michael Bldg., Calgary.	Waite Valley.
Calgary Development & Producers Ltd.	606-2nd St. W., Calgary.	Waite Valley.
Commonwealth Petroleum Ltd.	410 Lancaster Bldg., Calgary.	Blood Indian Reserve, Milk River, Red Coulee, Ribstone & Turner Valley.
Dalco Oils & Gas Co., Ltd.	201 Toronto General Trusts Bldg., Calgary.	Red Coulee.
Dalfin Petroleum Ltd.	411 Lancaster Bldg., Calgary.	Turner Valley.
Dauntless Oils Ltd.	300 Leeson-Lineham Blk., Calgary.	Skiff.
Dome Oils Ltd.	200-3 Leeson-Lineham Blk., Calgary.	Turner Valley.
Edalta Oils Ltd.	Wainwright.	Wainwright.
Frontier Developments Ltd.	Bank of Commerce Bldg., Edmonton.	Wildcat Hills.

*Producing and drilling.

Petroleum Industry—Concluded

Name	Address	Location
ALBERTA—Concluded		
Drilling only—concluded		
Gibraltar Oils Ltd.....	207 Insurance Exchange Bldg., Calgary.	Waite Valley.
Herron Petroleum Ltd.....	507-8 Lancaster Bldg., Calgary.	Bragg Creek (Herron).
Hudson's Bay Oil & Gas Co., Ltd.....	407 Herald Bldg., Calgary.	Eyremore, Highwood, Kehoe Lake, and Paintearth.
Interior Oil Co., Ltd.....	816 Toronto General Trusts Bldg., Winnipeg, Man.	Wainwright.
Invaders Petroleum Ltd.....	225A-8th Ave. W., Calgary.	Turner Valley.
Ko-Top Oils Ltd.....	2-4 Union Bldg., Calgary.	Ked Coulee.
Lethbridge Petroleum & Refineries Ltd.....	106 P. Burns Bldg., Calgary.	Blood Indian.
Lundy Petroleums Ltd.....	Albertan Bldg., Calgary.	Turner Valley.
Moose Oils Ltd.....	Calgary.	Moose Mountain.
Northwest Co. Ltd.....	606-2nd Ave. W., Calgary.	Turner Valley.
Oxville Oil, Gas & Development Co., Ltd.....	Oxville.	Ribstone.
Rayco Oils Ltd.....	Lloydminster.	Ribstone.
Richfield Petroleum Ltd.....	225A-8th Ave. W., Calgary.	Waite Valley.
Sarcee Oil & Development Co., Ltd.....	68 Canada Life Bldg., Calgary.	Sarcee Reserve.
Signal Hill Oil Co., Ltd.....	700 Centre St., Calgary.	Moose Mountain.
Southern Lowery Oils, Ltd.....	606-2nd St. W., Calgary.	Turner Valley.
Twin Dome Oil Co., Ltd.....	High River.	Twin Dome and Aldersyde.
Vanberta Oils Ltd.....	412 Yorkshire Bldg., Vancouver, B.C.	New Black Diamond and Turner Valley.
Warner Oils Ltd.....	531 Loughheed Bldg., Calgary.	Highwood.
Western Alberta Oil Co., Ltd.....	232 Portage Ave., Winnipeg, Man.	Highwood-Sinclair.
Weyman Petroleums Ltd.....	532 Loughheed Bldg., Calgary.	New Black Diamond.

OTHER NON-METAL MINING INDUSTRIES

Actinolite Mining Industry

Name	Address	Location
ONTARIO—		
Building Services Limited.....	1111 Beaver Hall Hill, Montreal, Que.	Ealzévir Tp.

Asbestos Mining Industry

Name	Address	Name of Mine	Location of Mine
QUEBEC—			
Asbestos Corporation, Limited.....	Canada Cement Bldg., Montreal.	Maple Leaf.....	Coleraine Tp.
		King.....	Thetford Tp.
		Beaver.....	Coleraine Tp.
		Vimy Ridge.....	Coleraine Tp.
		Asbestos Mines.....	Broughton Tp.
		British Canadian.....	Coleraine Tp.
Canadian Johns-Manville Co., Ltd.....	450 St. James St., Montreal.	Jeffrey.....	Shipton Tp.
Johnson's Company.....	Thetford Mines.		Thetford and Coleraine.
Keasbey & Mattison Company.....	Ambler, Penn., U.S.A.	Bell.....	Thetford Tp.
Nicolet Asbestos Mines, Limited.....	820 Transportation Bldg., Montreal.		Wotton and Tingwick Tps.
Northern Asbestos Company, Limited	Thetford Mines.		Black Lake.
Quebec Asbestos Corporation, Limited	East Broughton Station.		East Broughton Station.

Barytes

Name	Address	Location
NOVA SCOTIA—		
Brandram-Henderson, Limited.....	Montreal, Que.	East Lake Ainslie.

Bituminous Sands

Name	Address	Location
ALBERTA— McMurray Asphaltum & Oil, Limited..... Research Council of Alberta.....	Petrolia St., Petrolia, Ont..... Univ. of Alberta, Edmonton.....	Draper. McMurray Dist.

Diatomite

NOVA SCOTIA— International Diatomite Industries.....	Haverstraw, N.Y.....	East New Annan.
ONTARIO— Morrow, R.....	Muskoka Falls.....	Draper Tp.
BRITISH COLUMBIA— B.C. Refractories, Limited.....	660 Taylor St., Vancouver.....	Cariboo Mining Division.

Feldspar Mining Industry

QUEBEC— Bon Ami, Limited..... Brazéau, Maurice..... Cameron, Wm. & J. J..... Canadian Flint & Spar Company†..... Cooligan, Joe..... Donaldson, R. J..... Feldspar Quarries, Limited..... Larose, Antoine..... Melkman-Neubauer..... Mercier, Henri & Lauzon, John..... O'Brien & Fowler, Limited..... Ottawa Valley Mines, Limited..... Parcher, Alfred..... Pedneaud, Gonzague..... Whitfield, T..... Whitemore, Mrs. A. R.....	13719 Notre Dame St. E., Montreal. Buckingham..... Box 11, Buckingham..... Buckingham..... Buckingham..... Glen Almond..... Buckingham..... Weir..... Shaplay Creek..... Buckingham..... New Birks Bldg., Montreal..... Glen Almond..... Buckingham..... Buckingham..... 475 Kent St., Ottawa, Ont.....	Aylwin Tp. Fasley Lake. Buckingham West. Buckingham. Buckingham. Buckingham. Buckingham. Huberdeau. Shaplay. Derry Tp. Buckingham. Derry Tp. Buckingham. Buckingham. Derry Tp.
ONTARIO— Bathurst Feldspar Mines, Limited..... Craig, T. H..... Feldspar Glass, Limited..... Feldspar Quarries, Limited..... Frontenac Floor & Wall Tile Company, Limited†..... Genesee Feldspar Company, Inc..... Smith, Frank Egerton..... Wanup Feldspar Mines, Limited.....	230 King St. East, Toro to..... Box 300, Perth..... 301 Royal Bank Bldg., Toronto..... Buckingham, Que..... Box 178, Kingston..... Bovart St., Rochester, N.Y., U.S.A..... Box 377, Prescott..... Lucknow.....	Bathurst Tp. Bathurst Tp. Bathurst Tp. Perth. Kingston, Ont. Hybla and Verona. Lanark County. Dill Tp.
MANITOBA— Winnipeg River Tin Mines, Limited.....	401 Nokomis Bldg., Winnipeg.....	Lac du Bonnet District.

† Operates grinding plant.

Fluorspar

ONTARIO— Storlosar, Chas. A.....	Box 198, Madoc.....	Madoc.
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Garnets

QUEBEC— Langlade Garnet Limited.....	80 St. Pierre St., Quebec.....	Beaudin and Trevet Tps.
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Graphite Mining Industry

QUEBEC— Canadian Graphite Corporation.....	1193 Phillips' Place, Montreal.....	Boyer Tp.
ONTARIO— Black Donald Graphite Co., Limited.....	Calabogie.....	Brougham Tp.

Grindstone Industry

Name	Address	Location
NOVA SCOTIA— Murphy, Logan.....	Balmoral Mills.....	Waugho River.
NEW BRUNSWICK— Miramichi Quarry Company, Limited..... Read Stone Company, Limited.....	Quarryville..... Sackville.....	Quarryville. Stonehaven.
BRITISH COLUMBIA— McDonald, J. A. & C. H., Limited.....	1571 Main St., Vancouver.....	Vancouver.

Gypsum Mining Industry

NOVA SCOTIA— Atlantic Gypsum Products Company..... Canadian Gypsum Company, Limited..... Connecticut Adamant Plaster Company..... Iona Gypsum products, Limited..... North American Gypsum Company..... Nova Scotia Coal & Gypsum Company, Limited..... Windsor Gypsum Company..... Windsor Plaster Company, Limited.....	40 Central St., Boston, Mass..... Box 434, Windsor..... 10 River St., New Haven, Conn..... Iona..... Rutland, Vermont, U.S.A..... Box 13, Mabou..... Box 727, Newburgh, New York..... Windsor.....	Walton, Hants County. Wentworth Creek. Cheverie. Victoria County. Baddeck Bay. Mabou Harbour. Newport Station. Clarksville.
NEW BRUNSWICK— Canadian Gypsum Company, Limited..... Fraser, Donald.....	Box 434, Windsor, N.S..... Plaster Rock.....	Hillsborough. Plaster Rock.
ONTARIO— Gypsum, Lime & Alabastine, Canada, Limited.....	Paris.....	Caledonia and Lythmore.
MANITOBA— Gypsum, Lime & Alabastine, Canada, Limited..... Western Gypsum Products, Limited.....	Box 3057, Winnipeg..... 503 McArthur Bldg., Winnipeg.....	Gypsumville. Winnipeg.
BRITISH COLUMBIA— Gypsum, Lime & Alabastine, Canada, Limited..... Livingstone, J. S..... Torry, J. L.....	Paris, Ont..... Pavilion..... Clinton.....	Falkland. Clinton. Clinton.

Iron Oxide Industry

QUEBEC— Argall, Thos. H..... Canada Paint Company, Limited..... Montmorency Paint Products Co., Limited.....	La Pointe du Lac..... 572 William St., Montreal..... 1100 Craig St. E., Montreal.....	La Pointe du Lac. Champlain Co. Les Forges.
BRITISH COLUMBIA— McDonald, R. W.....	Box 157, Banff, Alta.....	Windermere District.

Magnesite Mining Industry

QUEBEC— International Magnesite Co., Limited..... Scottish Canadian Magnesite Co., Limited..... North American Magnesite Producers, Limited.....	Calumet..... 388 St. James St., Montreal.....	Harrington Tp. Grenville Tp.
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Manganese Bog

NEW BRUNSWICK— New Brunswick Mineral Development Company.....	Hillsboro.....	Dawson Settlement.
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Mica Mining Industry

Name	Address	Location
QUEBEC— Blackburn Bros., Limited..... Cross, W. C..... Laurel Mining Company, Limited..... Martin, A. G..... Mineral Products Company, Limited..... Nault, J. B..... Wilson, Mrs. S. E.....	711 Blackburn Bldg., Ottawa, Ont..... Cascades..... 4 Des Forges St., Three Rivers..... 236 Besserer St., Ottawa, Ont..... 1705 Royal Bank Bldg., Toronto 2, Ont. Maniwaki..... Cascades.....	East Templeton. Hull Tp. Argenteuil Co. Hull Tp. Cameron Tp. Ladysmith.

Mica Mining Industry—Concluded

Name	Address	Location
ONTARIO—		
Austin, Louis.....	Perth Road.....	Perth Road.
Kent Bros.....	Kingston.....	Bedford Tp.
Lee, W. W.....	Bedford Mills.....	Buck Lake.
Loughborough Mining Company, Limited.....	Sydenham.....	Frontenac County.
Martin, A. G.....	236 Besserer St., Ottawa.....	Portland.
O'Connor, W. J.....	Lombardy.....	Leeds County.

Mineral Waters Industry

QUEBEC—		
Abenakis Springs Company.....	Abenakis Springs.....	Yamaska County.
Eau Minérale Etoile.....	St. Genevieve de Batiscan.....	Rivière Batiscan.
Eau Naturelle Purgative de Chambord.....	Desbiens.....	Chambord.
Lemyre Mineral Water Enrg.....	Pont de Maskinonge.....	Maskinonge.
ONTARIO—		
Canada Dry Ginger Ale, Limited.....	6380 St. Urbain St., Montreal, Que.	Caledonia Springs and Bourget.
Carlsbad Limited.....	Carlsbad Springs.....	Gloucester Tp.
Deneault, F.....	Bourget.....	Bourget.
Gurd, Chas. and Co., Limited.....	1016 Bleury St., Montreal, Que.....	Caledonia Tp.
Sanitaris Limited.....	Box 358, Arnprior.....	Pakenham Tp.

Phosphate Mining Industry

QUEBEC—		
Blackburn Bros., Limited.....	711 Blackburn Bldg., Ottawa, Ont.	Templeton Tp.
BRITISH COLUMBIA—		
Consolidated Mining and Smelting Co. of Canada, Limited.....	Trail.....	Fort Steele Mining Division.

Pyrites Mining Industry

QUEBEC—		
Consolidated Copper and Sulphur Company.....	Eustis.....	Eustis.
ONTARIO—		
Canadian Pyrites, Limited.....	1400 Guardian Bldg., Cleveland, Ohio.	Flower Station.
BRITISH COLUMBIA—		
Britannia Mining and Smelting Co., Limited.....	Britannia Beach.....	Vancouver, B.C.

Quartz Mining Industry

NOVA SCOTIA—		
Dominion Steel and Coal Corp., Limited.....	Sydney.....	Leitchess Creek.
River Dennis Sand and Clay Co., Limited.....	Box 57, Port Hood.....	Melford.
QUEBEC—		
Cameron, Wm. and J. J.....	Buckingham.....	Buckingham West.
Canadian Carborundum Co., Limited.....	Box 65, Niagara Falls.....	St. Canut.
Canadian Flint and Spar Co., Limited.....	56 Sparks St., Ottawa, Ont.....	Buckingham.
Donaldson, Robert J.....	Glen Almond.....	Buckingham.
Gauthier, J. B.....	Box 226, Buckingham.....	Buckingham.
Mason Engineering Corp.....	803 St. Clarens Ave., Toronto, Ont.....	Guigues.
Mines Silica, Limitée.....	265 Racine St., Chicoutimi.....	Harvey Tp.
Montpetit, Euclide.....	Melocheville.....	Melocheville.
O'Brien & Fowler, Limited.....	Buckingham.....	Derry Tp.
Ottawa Silica Supply Company.....	East Templeton.....	Templeton.
Parcher, Alfred.....	Glen Almond.....	Derry Tp.
Pedneaud, Gonzague.....	Buckingham.....	Buckingham.
ONTARIO—		
Dominion Mines and Quarries, Limited.....	46 King St. W., Toronto.....	Killarney.
Falconbridge Nickel Mines, Ltd.....	Falconbridge.....	Falconbridge.
Wright & Company.....	960 Queen St., Sault Ste. Marie.....	Deroche Tp.
BRITISH COLUMBIA—		
Consolidated Mining and Smelting Co. of Canada.....	Trail.....	Oliver.
Granby Consolidated Mining, Smelting and Power Co., Limited.....	Hall Bldg., Vancouver.....	Nass River Mining Division.

Salt Industry

Name	Address	Location
NOVA SCOTIA— Malgash Salt Company, Limited.....	Box 264, New Glasgow.....	Malagash.
ONTARIO— Brunner Mond, Canada, Limited..... Canadian Industries Limited..... Dominion Salt Company, Limited..... Goderich Salt Company, Limited..... Kincardine Salt Company, Limited..... Western Canada Flour Mills Co., Limited..... Western Salt Company, Limited.....	501 Dominion Bank Bldg., Toronto.. Box 1260, Montreal, Que..... Sarnia..... Goderich..... Box 1260, Montreal, Que..... 287 MacPherson Ave., Toronto.. Toronto, Bank of Commerce Bldg. .	Amherstburg. Sandwich. Sarnia. Goderich. Kincardine. Goderich. Courtright.

Silica Brick Industry

NOVA SCOTIA— Dominion Steel & Coal Corp'n, Limited.....	Sydney.....	Sydney.
ONTARIO— Algoma Steel Corporation, Limited.....	Sault Ste. Marie.....	Sault Ste. Marie.

Sodium Carbonate Mining Industry

BRITISH COLUMBIA— Dominion Soda Producers, Limited..... Soda Mining & Products Company, Limited.....	222 Pacific Bldg., Vancouver..... 423 Hamilton St., Vancouver.....	Clinton. Clinton.
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Sodium Sulphate Mining Industry

SASKATCHEWAN— Horseshoe Lake Mining Company, Limited.....	c/o Barium Corp., South Charleston, West Virginia, U.S.A.	Tp. 9, Sec. 8, R. 25.
Natural Sodium Products, Limited.....	20 High St. W., Moose Jaw.....	Dunkirk.
Sodium Sulphate Refining Company.....	513 Lougheed Bldg., Calgary, Alta.	Tp. 34, Sec. 17, R. 27.
Sodium Corporation, Limited.....	Room 402, 302 Bay St., Toronto, Ont.	Alsask.
White Shore Salts & Chemical Co., Limited.....	North Battleford.....	Falo.

Talc and Soapstone Industry

QUEBEC— Broughton Soapstone Quarry Company, Limited.....	Broughton Station.....	Broughton Station.
ONTARIO— Canada Talc Company, Limited..... Gillespie, Geo. H. & Company, Limited..... Henderson Mines, Limited.....	Madoc..... Madoc..... Madoc.....	Huntingdon Tp. Huntingdon Tp. Huntingdon Tp.
BRITISH COLUMBIA— Creagh, John..... Kennedy & Holland.....	Colombia Hotel, Vancouver..... Sooke Lake P.O.....	Anderson Lake. Leechtown.

Volcanic Dust Industry

SASKATCHEWAN— Van Kel Cleansers, Limited.....	Railway St. N., Swift Current.....	Ws. 7, 19, 13-15 W. 3rd and S. 4 Ws. 19, 13-15 W. 3rd.
BRITISH COLUMBIA— Groome, G. G.....	William's Lake.....	William's Lake.

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

CLAY PRODUCTS INDUSTRY

Brick, Tile and Sewer Pipe

Name	Address	Location
NOVA SCOTIA—		
Brooks, Geo. & Son	New Glasgow	Plymouth.
Brooks, Stephen & Sons	P.O. Box 359, New Glasgow	New Glasgow.
Dominion Steel & Coal Corp'n, Ltd., D. I. & S. Division.	Sydney	Sydney.
Miller, Jas. B.	Elmsdale	Barney Brook.
Nova Scotia Clay Works, Limited	P.O. Box 140, Halifax	Elmsdale.
Shaw, L. E., Limited	Avonport	Avonport.
Standard Clay Products, Limited	St. Johns, Quebec	New Glasgow.
NEW BRUNSWICK—		
Little River Brick Co., Limited	Little River P.O., St. John	Little River.
Loggie, W. S. Co., Limited	Chatham	South Nelson.
Ryan, M. & Son, Limited	Woodstock Road, Fredericton	Fredericton.
Shaw, L. E., Limited	Avonport, Nova Scotia	Chipman.
QUEBEC—		
Ascot Tile & Brick Co., Limited	Ascot	Canton Stoke.
Brique Citadelle Limitée	14-16 St. Joseph St., Quebec	L'Islet and Boischatel.
Brique Chicoutimi Limitée	Chicoutimi	Chicoutimi
Brique Frontenac Limitée	140 rue St. Jean, Quebec	Beauport Est.
Brique de Scott Limitée	Scott Junction	Scott Junction.
Briqueterie Lotbinière Limitée	Deschailons	Deschailons.
Cooksville Co., Limited	120 St. James St., Montreal	Delson.
Eastern Townships Brick & Tile Co., Limited	East Angus	East Angus
Hodgins, David T.	Shawville	Clarendon.
Industrielle de St. Tite	St. Tite	St. Tite.
Longpré, Emile	St. Felix de Valois	St. Felix de Valois.
Mathieu, Amédée	Victoriaville	Victoriaville
Montreal Terra Cotta Co., Limited	1117 St. Catherine W., Montreal	Lakeside Co., Jacquer Cartier.
National Brick Co. of Laprairie, Limited	Canada Cement Bldg., Montreal	Laprairie and Delson.
St. Lawrence Brick Co., Limited	29 St. James W., Montreal	Laprairie.
Standard Clay Products	St. Johns	St. Johns.
ONTARIO—		
Baird Oliver Estate	Parkhill	Parkhill.
Barnhardt, W. H.	Stratford	Stratford.
Batchelor, Samuel	Proton Station, R.R. 3	Artemessia.
Bay of Quinte Brick Works	Belleville	Belleville.
Booth Brick & Lumber Company	Box 97, New Toronto	Etobicoke Tp.
Booth, Crang, Limited	New Toronto	Wilson Ave., N. York.
Brampton Pressed Brick Co., Limited	Brampton	Brampton
Broodwell, B. & Son	Box 137, Kingsville	Gosfield South.
Butwell, R.	107 Lake Shore, Rd., Humber Bay	Humber Bay.
Caledon Shale-Brick, Limited	1167 Bay Street, Toronto	Caledon Tp.
Campbell, N. F. & Sons	West Lorne	Aldborough Tp.
Canadian Fire Clay Products, Ltd.	603 Adelaide St. E., Toronto	New Toronto.
Canadian Pressed Brick Co., Limited	195 Ottawa St., Hamilton	Bartonville.
Casemore, R. & Son	Shallow Lake	Shallow Lake.
Chapman Bros.	145 Dawes Rd., Toronto	East York Tp.
Chapman, John	R.R. No. 3, Napanee	North Fredericksburg Tp.
Cooksville Company, Limited	120 St. James St., Montreal	Cooksville.
Cooper, W. H.	608 Lister Block, Hamilton	Hamilton.
Cornhill, James & Sons, Limited	Grand Ave. E., Chatham	Chatham.
Cowell, George W.	Box 361, Tillsonburg	Oxford.
Crawford Bros.	451 King W., Hamilton	Hamilton.
Curtin, Frank	R.R. No. 4, Lindsay	Lindsay.
Curtis Bros.	Box 809, Peterborough	Otonabee Tp.
Dalton, Mark	R.R. No. 3, Dresden	Dawn Tp.
Deller, Albert & Son	Brownsville	Dereham.
Deller Bros.	R.R. No. 2, Norwich	North Norwich.
Deller, Wm. H.	R.R. No. 4, Thorndale	West Nissouri.
Denison Tile Company, Limited	24 Wyandotte St. E., Windsor	Fletcher, Rochester Tp., and Tilbury E. Tp.
Dochart Brick, Tile and Terra Cotta Works	Arnprior, Ont.	Arnprior.
Dolan, John	R. R. No. 2, Watford	Warwick Tp.
Donaldson, G. A.	R.R. No. 4, Harriston	Minto Tp.
Donaldson, Thos. Geo.	R.R. No. 1, Greenock	Culross Tp.
Douglas, J. R. and Douglas, John	Wilkesport	Sombra Tp.
Dover Brick and Tile Works	134 Ursuline Ave., Chatham	Dover Tp.
Dublin Tile Yard	Dublin	Hibbert.
Elliott, Charles	Bluevale	Turnberry.
Elliott, James, Jr.	519 Wellington St., W., Sault Ste. Marie	Korah Tp.
Elliott, Wm.	Glenannan	Culross Tp.
Ferguson, A. W.	794 Nelson St., London	London
Forest Tile Yard	Forest	Forest.
Frid Bros., Limited	Main West and Macklin Sts., Hamilton	Hamilton.
Gammage, C. R.	R.R. No. 2, Dresden	Dresden.

Brick, Tile and Sewer Pipe—Continued

Name	Address	Location
<i>ONTARIO—Continued</i>		
Gardiner, Wm.	Box 83, Blenheim	Harwick Tp.
Godfrey, Thos. and Company	Carleton Place	Beckwith Tp.
Grimsby Brick and Tile, Limited	Grimsby	Grimsby.
Haist, R. W.	Crediton	Crediton.
Hallatt, Wm. Clay Products	4 Richards Block, Chatham	Raleigh Tp.
Halton Brick Co., Limited	28 Symes Rd., Toronto 9	Halton Co.
Hamilton Pressed Brick Co., Limited	Kensington Ave. S., Hamilton	Hamilton.
Hill, Aaron	Essex	Maidstone Tp.
Hill, A. W.	R.R. No. 1, Coatsworth	Tilbury East.
Hillman, Wm.	Staples	Staples.
Hitch, D. A.	Erie St. N., Ridgetown	Ridgetown.
Hitch, Thomas	1st Ave., St. Thomas	Yarmouth Heights.
Hodder, Mrs. J. H. and Sons	Dutton	Dutton.
Houston, The Co., Limited	Box 130, Belleville	Hungerford.
Howlett, Fred. W. & Sons, Limited	Box 3, Petrolia	Moore and Enniskillen Tps.
Huntsville Brick Works	Box 308, Huntsville	Chaffey Tp.
Interprovincial Brick Co., Limited	28 Queen St. E., Toronto	Cheltenham and Milton.
Jackson, W. B.	290 Rawden St., Brantford	Brantford.
Jameson Lime Co.	Renfrew	Renfrew.
Janes, D. A.	Mt. Brydges	Caradoc Tp.
Jasperson Brick and Tile Company	Box 586, Kingsville	Coatsworth.
Jervis, W. J.	R.R. No. 3, Dorchester	North Dorchester.
Johnson, James Estate	R.R. No. 3, Pembroke	Stafford Tp.
Kerr, Chas.	R.R. No. 4, Goderich	St. Catharines
Kerr, Frederick	Crediton	Crediton E.
Koebel Bros.	Box 54, St. Clements	Wellesley Tp.
Lindsay, Earl	R.R. No. 2, Wallaceburg	Chatham Tp.
Martin, Thos. E.	Thamesville	Howard Tp.
Maw, Wm. T.	Minesing	Minesing.
McComb, Chester	R.R. No. 2, London	London Tp.
McCormick Bros.	R.R. No. 5, Watford	Warwick Tp.
McEachran & Son	Highgate	Highgate.
McFarren, F. B., Limited	18 Toronto St., Toronto 2	Streetsville.
McMahon, Robert	R.R. No. 2, Kerwood	Metcalfe Tp.
Middleton, Chas.	Wyoming	Plympton Tp.
Milton Brick, Limited	1158 Bay St., Toronto 5	Streetsville and Milton.
Miner, Manly F.	Kingsville	Gosfield South.
Moulton, John	Greenock	Greenock.
National Fire Proofing Company of Canada, Ltd.	601 Dominion Bank Bldg., Toronto	Aldershot.
New Liskeard Sewer Pipe Company, Limited	Aldershot	Aldershot, Hamilton, Mimico and Wentworth Co.
New Liskeard Brick Works	Box 74, New Liskeard	New Liskeard.
Olmann Bros.	111 Macklin St., Hamilton	Hamilton.
Ontario Brick and Tile Plants	Prov. Secy. Dept., Ontario Govt., Toronto	Mimico.
O'Reilly, T. E.	320 Bay St., Ottawa	Prescott Highway.
Ottawa Brick and Terra Cotta Co., Limited	Billings Bridge	Gloucester Tp.
Ott Brick and Tile Manufacturing Co., Limited	33 King St. E., Kitchener	Kitchener.
Owen Sound Brick Co., Limited	928 2nd Ave. E., Owen Sound	Owen Sound.
Parke, H. W.	R.R. No. 2, Dresden	Camden Tp.
Paxton, Fred R.	70 Herrick Ave., St. Catharines	St. Catharines.
Pembroke Brick Co.	Pembroke	Pembroke.
Phinn, George A.	St. James Park, London	Westminster Tp.
Phippen, H. W. & Son	Box 11, Coleman	East York Tp.
Piggott, Geo. & Co.	72 Guestville Ave., Toronto 9	York.
Piper, Murphy & Piper	509 Victoria Ave., Fort William	Fort William.
Port Credit Brick, Limited	26 Queen St. E., Toronto	Toronto Tp.
Port Rowan Brick and Tile Co.	Port Rowan	Port Rowan.
Price and Smith	458 Greenwood Ave., Toronto	Toronto.
Richardson, J. & Son	Kerwood	Kerwood.
Richard Tope Brick Works	945 Main St. W., Hamilton	Hamilton.
Russell Brick Co.	40 Blake St., Toronto	Toronto.
Sherman Clay Products, Ltd.	Ruscomb	Ruscomb.
Snelgrove, A.	Beaverton	Thorah Tp.
Sproat, William M.	R.R. No. 4, Seaforth	Tuckersmith Tp.
Standard Brick Co., Limited	500 Greenwood Ave., Toronto	Toronto.
Steele, Edwin	Vankleek Hill	Hawkesbury.
Stroh, M. C.	Conestogo	Woodwich.
Sun Brick and Tile Co., Limited	1104 Bay St., Toronto	Don Valley.
Superior Brick and Tile Co., Limited	426 Victoria Ave., Fort William	Paipoonge Tp.
Sutherland, W. A.	Parkhill, Ont.	Parkhill.
Telford, John C.	Southwold Station	Southwold Station.
Thomson, Ralph	Henfryn	Huron Co.
Toronto Brick Co., Limited	897 Bay St., Toronto	Toronto, Milton and York Tps.
Voakes, David & Son	Ruscomb	Ruscomb.
Vernon Brick and Tile Works	153 Dawes Rd., Toronto	East York Tp.
Wagstaff, Charles	R.R. No. 4, Lindsay	Lindsay.
Waide, J. C.	Alvinston	Brooke Tp.
Waite, John E.	Forester's Falls	Forester's Falls.
Wallace, R. & Son	66, 1st Ave. E., North Bay	Weddfield Tp.
Watson, W. S.	Thedford	Bosanquet Tp.
Wein, Aaron	Crediton	Stephen.
Weitzel, J. E.	R.R. No. 1, Tavistock	East Zorra.
Winch, Stuart A.	Box 220, Paisley	Paisley.
Windsor Brick and Tile Co.	30 Labell Blvd., Windsor	Kingsville.
Wright, Geo. & Sons	Box 56, Comber	Comber.

Brick, Tile and Sewer Pipe—Concluded

Name	Address	Location
MANITOBA—		
Alsip Brick, Tile and Lumber Co., Limited.....	537 Portage Ave., Winnipeg.....	Winnipeg.
Marion Brick Co.....	Box 30, St. Boniface.....	St. Boniface.
National Clay Products.....	521 Somerset Bldg., Winnipeg.....	Edrans.
Snyder Brickyard, Limited.....	Portage la Prairie.....	Portage la Prairie.
Wardrop, D. M.....	Whitemouth.....	Whitemouth.
SASKATCHEWAN—		
Bruno Clay Works, Limited.....	306 Birks Bldg., Saskatoon.....	Bruno.
Dominion Fire Brick and Clay Products, Ltd.....	106-7 Kern Bldg., Moose Jaw.....	Claybank.
International Clay Products, Limited.....	Estevan.....	Estevan and Prince Albert.
Shand Coal and Brick Co.....	Shand.....	Shand.
Yorkton Brick Yard.....	7th Avenue, Yorkton.....	Yorkton.
ALBERTA—		
Acme Brick Co., Limited.....	125 Alberta Block, Edmonton.....	Cannell Siding.
Alberta Clay Products Co., Limited.....	Box 672 Medicine Hat.....	Medicine Hat.
Crandell, E. H., Pressed Brick and Sandstone Co.	607 Maclean Bldg., Calgary.....	Brickburn.
Johansen, K.....	Box 1722, Grande Prairie.....	Grande Prairie.
Little, J. B. & Sons, Limited.....	9120-100th Ave., Edmonton.....	Edmonton.
Medicine Hat Brick and Tile Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Redcliff Brick and Coal Co., Limited.....	Redcliff.....	Redcliff.
Redcliff Premier Brick Co., Limited.....	Redcliff.....	Redcliff.
Redcliff Pressed Brick Co., Limited.....	Redcliff.....	Redcliff.
BRITISH COLUMBIA—		
Baker Brick and Tile Co., Limited.....	cor. Douglas and Tolmie Ave., Victoria.	Victoria.
B.C. Refractories, Limited.....	660 Taylor St., Vancouver.....	Williams Lake.
Christian Community of Universal Brotherhood, Ltd.	Brilliant.....	Grand Forks.
Clayburn Company, Limited.....	850 West Hastings St., Vancouver...	Kilgard and Clayburn.
Gabriola Shale Products, Limited.....	Moody Block, Victoria.....	Gabriola Island.
Gorse, P. A.....	Salmon Arm.....	Enderby.
Haug, Wm. & Son.....	Box 166, Kelowna.....	Kelowna.
Pacific Brick Limited.....	Room 801—475 Howe St., Vancouver	New Westminster.
Port Haney Brick Co., Limited.....	846 Howe St., Vancouver.....	Port Haney.
Prince George Brick Yard.....	Prince George.....	Prince George.
Smithers Brickyard.....	Smithers.....	Smithers.
Vancouver Brick and Tile Co., Limited.....	2521 Maple St., Vancouver.....	Sullivan.
Victoria Brick Company, Limited.....	3001 Douglas St., Victoria.....	Victoria.

Stoneware and Pottery

NEW BRUNSWICK—		
Foley Pottery, Limited.....	Loch Lomond Road, St. John.....	St. John.
ONTARIO—		
Davis, John and Son, Limited.....	601 Merton St., Toronto.....	Toronto.
Foster Pottery Company.....	Main St. W., Hamilton.....	Hamilton.
ALBERTA—		
Medalta Potteries, Limited.....	Medicine Hat.....	Medicine Hat.
BRITISH COLUMBIA—		
B.C. Clay Products Company.....	Fort Crompton Road, Vancouver....	Vancouver.

Cement Industry

QUEBEC—		
Canada Cement Company, Limited.....	Canada Cement Bldg., Montreal...	Hull and Montreal East.
National Cement Company.....	Box 2770, Montreal.....	Montreal East.
ONTARIO—		
Canada Cement Company, Limited.....	Canada Cement Bldg., Montreal, Que	Belleville, Lakefield and Port Colborne.
St. Mary's Cement Company, Limited.....	357 Bay St., Toronto.....	St. Mary's.
MANITOBA—		
Canada Cement Company, Limited.....	Canada Cement Bldg., Montreal, Que.	Fort Whyte.
ALBERTA—		
Canada Cement Company, Limited.....	Canada Cement Bldg., Montreal, Que.	Exshaw.
Marlboro Cement Company.....	Box 340, Edmonton.....	Marlboro.
BRITISH COLUMBIA—		
British Columbia Cement Company, Limited....	305 Belmont House, Victoria.....	Bamberton.

Lime Industry

Name	Address	Location
NOVA SCOTIA—		
Dominion Steel and Coal Corporation, Limited.....	Sydney.....	Point Edward and Sydney.
Eastern Lime Company, Limited.....	Windsor.....	Windsor.
NEW BRUNSWICK—		
Bathurst Power and Paper Co., Limited.....	Bathurst.....	Bathurst.
Peters, C. H. and Sons, Limited.....	107 Prince William St., Saint John..	Torriburn.
Purdy and Green.....	323 Main St., Saint John.....	Saint John.
Snowflake Lime, Limited.....	3 Pokiok Road, Saint John.....	Saint John.
QUEBEC—		
Beaudry, Armand.....	16 rue St. Angélique, Joliette.....	Joliette.
Boivin, Arthur.....	Pont Rouge.....	Pont Rouge.
Canada Lime and Stone, Limited.....	St. Marc des Carrières.....	St. Marc des Carrières.
Dominion Lime Company.....	East Angus.....	Lime Ridge.
Héon et Héon.....	St. Louis de France.....	St. Louis de France.
Lalumière, Joseph.....	St. Dominique de Bagot.....	St. Dominique de Bagot.
Laurentian Stone Company, Limited.....	250 Catherine St., Ottawa, Ont.....	Wrightville.
Limoges, Fils, Limitée.....	552 rue Poupart, Montreal.....	St. Michel.
Mercur, Camille.....	9 rue St. Denis, St. Hyacinthe.....	St. Dominique de Bagot.
Shawinigan Chemicals, Limited.....	83 Craig St. West, Montreal.....	Bedford.
Standard Lime Company, Limited.....	Joliette.....	St. Paul de Joliette, St. Marc des Carrières.
Stinson-Reeb Builders' Supply Company, Limited.....	360 Dorchester St. W., Montreal.....	Côte St. Michel.
ONTARIO—		
American Cyanamid Company.....	535 Fifth Ave., New York City, U.S.A.	Beachville.
Biederman, Albert G.....	Golden Lake, R.R. No. 1.....	Golden Lake.
Brunner Mond, Canada, Limited.....	501 Dominion Bank Bldg., Toronto.	Amherstburg.
Cameron, W. M.....	Carleton Place.....	Ramsay Tp.
Canada Lime Company, Limited.....	6 Toronto St., Toronto 2.....	Coboconk.
Chalmers and Campbell.....	689-7th St. W., Owen Sound.....	Owen Sound.
Dominion Rock Products, Limited.....	506 Dominion Square Bldg., Montreal.	Eganville.
Dominion Sugar Company, Limited.....	Chatham.....	Chatham and Wallaceburg.
Gallagher Limestone Company, Limited.....	Upper James St., Hamilton.....	Barton Tp.
Gypsum, Lime and Alabastine, Canada, Limited.....	Paris.....	Beachville, Limehouse, Elora, Milton and Hespeler.
Jamieson Lime Company.....	Renfrew.....	Renfrew.
Shane Lime Company.....	Eganville.....	Eganville.
Standard White Lime Company, Limited.....	15 Douglas St., Guelph.....	Guelph.
Toronto Brick Company, Limited.....	897 Bay St., Toronto.....	Coboconk.
Wepler, Henry.....	Priceville, R.R. No. 2.....	Glenelg Tp.
MANITOBA—		
Gillis Quarries, Limited.....	Richard and Spruce Sts., Winnipeg.	Garson.
Gypsum, Lime and Alabastine, Canada, Limited.....	Box 3057, Winnipeg.....	Winnipeg.
Moosehorn Lime Company, Limited.....	812 Boyd Bldg., Winnipeg.....	Moosehorn.
Winnipeg Supply and Fuel Company, Limited.....	812 Boyd Bldg., Winnipeg.....	Stonewall.
ALBERTA—		
Loder's Lime Company, Limited.....	Kananaskis.....	Kananaskis.
Summit Lime Works.....	Box 273, Lethbridge.....	S. 1, Sec. 7, Tp. 8, R. 5, W. 5.
BRITISH COLUMBIA—		
Hedley Gold Mining Company, Limited.....	Hedley.....	Hedley.
Pacific Lime Company, Limited.....	744 Hastings St. W., Vancouver.....	Texada Island.
Pacific Mills, Limited.....	Foot of Raymur, Vancouver.....	Gunboat Pass.
Reno Gold Mines, Limited.....	Salmo.....	Nelson Mining Division.
Rosebank Lime Company.....	744 Hastings St. W., Vancouver.....	Esquimalt.

Sand and Gravel

NOVA SCOTIA—		
Avon River Power Company, Limited.....	Water St., Windsor.....	Kings County.
Campbell, J. J. and Son.....	Boisdale.....	Boisdale.
Foundation Co. of Canada, Limited.....	1538 Sherbrooke St. W., Montreal, Que.	Milton.
MacNeil Bros.....	Box 593, North Sydney.....	Beaver Cove.
McSween, A. H.....	Ironville.....	Ironville.
Mosher, Walter.....	307 Portland St., Dartmouth.....	Elmsdale.
Norrie, Henry J.....	R.R. No. 6, Colchester.....	Colchester.
Nova Scotia Dept. of Highways.....	Halifax.....	
Nova Scotia Power Commission.....	Halifax.....	Halifax.
Routledge, W. F.....	Reserve Mines, Cape Breton.....	Lingan, Cape Breton.
Walker, A. G.....	Bridgetown.....	Bridgetown.
NEW BRUNSWICK—		
Anderson, A. W.....	Fairville.....	Saint John County.
Fundy Fur and Feather Farm.....	Little River.....	Saint John County.
Likely, Jos. A.....	Saint John.....	East Saint John.
Maxwell, C. O. and Son.....	St. Stephen.....	Charlotte County.

Sand and Gravel—Continued

Name	Address	Location
QUEBEC—		
Alcoa Power Company, Limited.....	Box 620, Kenogami.....	Chicoutimi County.
Asbestos Corporation, Limited.....	Canada Cement Bldg., Montreal.....	Thetford Mines.
Beaudet, Joseph.....	Victoriaville.....	Victoriaville.
Beaudry, Joseph Pitro.....	Box 209, Joliette.....	Joliette.
Beauharnois Construction Company.....	1620 University Tower, Montreal.....	Beauharnois.
Beebe, Municipality of.....	Beebe.....	Belœil.
Bélanger, Joseph.....	Ascot Corner.....	Ascot Corner.
Bélisle, Euclide.....	Coaticook.....	Coaticook.
Bellay, Joseph Octave.....	22 St. Jean Baptiste, St. Jonquière.....	Jonquière.
Benoit, J. A.....	Mont St. Grégoire.....	Mont St. Grégoire.
Bergeron, Ursin.....	Jonquière.....	Jonquière.
Bernier, Mrs. Joseph.....	Beclil.....	Beclil.
Bigras, Omer.....	Ste. Dorothée.....	Ste. Rose West.
Blais, Jos.....	10 Ave. Mont-Marie, Lévis.....	St. Romuald.
Boivin, Thomas.....	7 Ave. Lafontaine, Chicoutimi.....	Chicoutimi.
Bonner Sand and Ballast.....	1434 St. Catherine St. W., Montreal.....	Abbotsford.
Boulet, Henri.....	6 Frontenac St., Montmagny.....	Rivière du Sud.
Bourgeois, Edmond.....	St. Albert.....	St. Albert.
Brault, Delphis.....	St. Alexandre.....	St. Alexandre.
Brault, Wm.....	16-1st Ave. S., Sherbrooke.....	Orford Tp.
Breault, F. X.....	St. Dominique de Bagot.....	St. Dominique de Bagot.
Brouillet Sand and Gravel.....	Rawdon.....	St. Julienne.
Canadian Johns-Manville Co., Limited.....	Montreal.....	Shipton Tp.
Cloutier, J. E.....	100 Cartier St., Chicoutimi.....	Chicoutimi.
Coaticook, City of.....	100 Child St., Coaticook.....	Coaticook.
Commission du Havre de Montreal.....	Montreal.....	St. Lawrence River.
Compagnie de Sable, Limitée.....	10-3ème Ave., Limoulu, Québec.....	St. Charles River.
Consolidated Oka Sand and Gravel Co., Limited.....	248 McCord St., Montreal.....	St. Maurice River.
Côté, Elie.....	Hébertville.....	Lake St. John.
Côté, Hector.....	R.R. No 4, Sherbrooke.....	Stoke Road, Sherbrooke.
Côté, Mrs. Albert.....	St. Fulgence.....	Chicoutimi County.
Cusson, Ernest.....	Ste. Rose.....	Ste. Rose.
Dalcourt, Henri.....	St. Félix de Valois.....	St. Félix de Valois.
Denis, Madame Hormidas.....	112 Brière St., St. Jérôme.....	St. Jérôme.
Demers, François.....	St. Romuald.....	St. Romuald.
Desjardins, Alphonse.....	75 St. Agnes St., Quebec.....	Beauport.
Deslandres, Mastai.....	St. Dominique de Bagot.....	St. Dominique de Bagot.
Desrochers, Oscar.....	Warwick.....	Warwick.
Dubreuil, Albert.....	St. Dominique de Bagot.....	St. Dominique de Bagot.
Ducharme, Adélard.....	St. Félix de Valois.....	St. Félix de Valois.
Dupuis, H. & Sons, Limited.....	Maisonneuve St., Hull.....	Hull.
Ewing, W. J.....	Richmond.....	Cleveland Tp.
Fortier, Laurent.....	Box 268, Montmagny.....	Montmagny.
Frigon, Prosper.....	Batiscan.....	Ste-Anne-de-La-Pérade.
Gagné, Mrs. J. B. A.....	Boischatel.....	Boischatel.
Gagnon, Louis-Philippe.....	St. David de Lévis.....	St. Téséphore.
Gagnon, Lucien.....	L'Acadie.....	L'Acadie.
Gauthier, W.....	Racine St. Chicoutimi.....	Chicoutimi.
Granger, Ildege.....	Ste-Marie Salomée.....	Ste-Marie Salomée.
Grenier, Appolinaire.....	Beauport East.....	Beauport East.
Hamel, Amédée.....	Victoriaville.....	Victoriaville.
Hayden, R. B.....	Hemmingford.....	Hemmingford.
Hemmingford Council.....	Hemmingford.....	Hemmingford.
Independent Sand Co., Limited.....	3731 Notre Dame St. E., Montréal.....	Lake St-Peter.
Jeannotte Téséphore.....	St-Hilaire.....	St. Hilaire.
Jette, Albert.....	Acton Vale.....	Acton Vale.
Landry, Moise.....	Hemmingford.....	Hemmingford.
Laporte, Arthur.....	53 rue DeLanaudière, Joliette.....	Joliette.
Lapporte, Jos.....	Joliette.....	Joliette.
Latulippe, Philippe and Amedée.....	240 rue de la Ronde, Québec.....	St. Charles River.
Lebeau, Mrs. Antoine.....	St. Jérôme.....	St. Jérôme.
Leger and Charlton, Limited.....	400 Notre Dame St., Lachine.....	Chateauguay County.
LeMay, René.....	St. Jérôme.....	St. Jérôme.
Lemieux, A.....	St. Dominique de Bagot.....	St. Dominique de Bagot.
Leonard, Hormidas.....	St. Vincent de Paul.....	St. Vincent de Paul.
Lépine, Pierre.....	St. Pierre de Charlesbourg.....	St. Pierre de Charlesbourg.
Letourneau, Arthur.....	St. Rémi.....	St. Rémi.
Levesque, Trefflé and Georges.....	Kenogami.....	Jonquière's Tp.
L'Heureux, Emile.....	Warwick.....	Warwick.
MacNeil, Wm.....	West Brome.....	West Brome.
Massicotte and Gagnon.....	Hudson.....	Hudson and Dragon.
Melançon, J. T. A.....	Grand Mère.....	Grand Mère.
Metras, Esdras.....	Mont St. Grégoire.....	Mont. St. Gregoire
Moody, J. Harry.....	St. Louis Ave., Terrebonne.....	Terrebonne.
Paradis, G. H.....	Hébertville.....	Hébertville.
Paradis, Pitre.....	Hébertville.....	Hébertville.
Pépin, Abeas, Limited.....	240 St. Thomas St., Longueuil.....	Ste. Philomene.
Pepin, Polidor.....	Richmond.....	Richmond.
Poliquin, Napoléon.....	42 St. Henri St., Sherbrooke.....	Ascot Tp.
Potvin and Gagnon.....	St. Joseph d'Alma.....	St. Joseph d'Alma.
Quebec, City of.....	Desjardins St., Quebec.....	St. Michel de Beauport.
Quebec, Department of Roads.....	Parliament Buildings, Quebec.....	
Renaud, Elzear.....	Lac St. Charles.....	Lac St. Charles.
Richard, Gustave.....	Ste. Marie Salomée.....	Ste. Marie Salomée.
Rivest, J. C. L.....	Joliette.....	Joliette.
Robert, Pierre.....	Beauport.....	Beauport.

Sand and Gravel—Continued

Name	Address	Location
QUEBEC—Concluded		
Rocheffort, Léon.....	Cap de la Madeleine.....	Cap de la Madeleine.
Roulier, Arsene.....	L'Acadie.....	L'Acadie.
Sablrière Municipale.....	400 rue Deffleurimont, Montréal.....	St. Felix de Valois.
Saumure, Octave.....	Bouchette.....	Bouchette.
Shawinigan Engineering Co., Limited.....	107 Craig St. W., Montreal.....	Champlain and Maskinonge Counties.
Sherbrooke, City of.....	Sherbrooke.....	Orford Tp.
Société de Construction et ouvrière de Chicoutimi.....	7 Lafontaine St., Chicoutimi.....	Chicoutimi.
Sorel Sand Company, Limited.....	St. Joseph de Sorel.....	St. Lawrence River.
Standard Lime Company, Limited.....	Joliette.....	St. Emelie.
St. Louis, Nap.....	Ste. Ursule.....	Fontarabie.
Tetrault, Emile.....	Mont St. Grégoire.....	Mont St. Grégoire.
Tétu, Philippe.....	Montmagny.....	Montmagny.
Thibault, Maurice.....	Cap de la Madeleine West.....	Cap de la Madeleine.
Three Rivers Sand.....	8 du Platon St., Three Rivers.....	Three Rivers.
Tremblay, Emile.....	3474 McTavish St., Montreal.....	L'Acadie.
Tremblay, Henri.....	St. Fulgence.....	Chicoutimi Co.
Tremblay, O. and J. E. Massicotte.....	Chicoutimi.....	Chicoutimi.
Vezina, Edouard.....	St. Emile.....	Quebec County.
ONTARIO—		
Adair, Dolson.....	Caledon East.....	Caledon Tp.
Allan, Jos.....	Seaforth.....	Tuckersmith.
Allen, Ward.....	Goderich.....	Goderich.
Ashton, Thomas.....	1354 Queen St. E., Toronto.....	Scarboro.
Axford, J. B. and Sons.....	35 Elm St., St. Thomas.....	Yarmouth Tp.
Bast, Aaron.....	112 Lydia St., Kitchener.....	Waterloo Tp.
Baumgartner, Henry.....	R.R. No. 1, Hespeler.....	Hespeler.
Becker, George.....	R.R. No. 1, Dashwood.....	Hay Tp.
Beines, W. F.....	R.R. No. 2, Listowel.....	Grey Tp.
Bell Bros.....	Bayfield.....	Huron Co.
Bellyou, N. E.....	R.R. No. 4, Trenton.....	Murray Tp.
Benson and Patterson.....	Stamford.....	Stamford Tp.
Birch, Jas.....	Richmond.....	Nepean Tp.
Bisonette, W. A.....	Box 595, Smith's Falls.....	Montague Tp.
Blizard, Mrs. R. E.....	R.R. No. 6, London.....	London Tp.
Boyd Bros.....	Osgoode.....	Osgoode.
Bradt, Levi.....	R.R. No. 5, Cayuga.....	Haldimand.
Brantford, City of.....	City Hall, Brantford.....	Brantford.
Bray, J. M.....	R.R. No. 2, Brussels.....	Grey Tp.
Burrows, John.....	447 Klock Ave., North Bay.....	Widdifield Tp.
Butler, M. J.....	Clinton.....	Huron County.
Cameron, Chas. M.....	R.R. No. 1, Glencoe.....	Middlesex Co.
Campbell, Jeremiah.....	Dashwood.....	Dashwood.
Campbell, T. B.....	R.R. No. 1, Brucefield.....	Stanley Tp.
Cannell, J. T. M.....	Inglewood.....	Caledon.
Carroll Bros.....	490 Ellicott Square, Buffalo, N. Y.....	Sherkston.
Carson, W. W.....	R.R. No. 2, Toronto.....	York Mills.
Chisholm, W. S.....	R.R. No. 3 Milton West.....	Halton Tp.
Conlin, Herbert L.....	156 Front St. E., Toronto.....	Highland Creek.
Connell Bros.....	Clinton.....	Goderich Tp.
Consolidated Sand and Gravel Limited.....	402 Harbour Bldg., Toronto.....	Paris.
Cotterill, Alfred A.....	242 Wellington Road S., London.....	Westminster Tp.
Crosley, Wm.....	Princeton.....	Blenheim Tp.
Cross, Albert G.....	Vankleek Hill.....	Hawkesbury West.
Crosthwaite, F.....	1687 King St. E., Hamilton.....	Hamilton.
Cudmore, Mrs. Alice.....	R.R. No. 1, Hensall.....	Huron Co.
Cudmore, Mrs. Bertha.....	R.R. No. 6, Thamesville.....	Howard Tp.
Cunningham, T. W.....	Box 139, Innerkip.....	Oxford Co.
Cuthbert, C. E.....	R.R. No. 1, Currier.....	Oxford West.
Dean, Mrs. Jennie W.....	Tillsonburg.....	Middleton Tp.
Dingman, E.....	197 Albert St., Stratford.....	Oxford Co.
Dominion Concrete Company, Limited.....	Kemptville.....	Gower and Oxford Tps.
Donald, Andrew.....	R.R. No. 1 Ingersoll.....	Oxford Co.
Dunham, Jas. H.....	R.R. No. 8, London.....	London Tp.
Durham Stone and Sand Company, Limited.....	402 Harbour Bldg., Toronto.....	Durham.
Ellins Bros.....	Station "D," West Toronto.....	Etobicoke Tp.
Empire Limestone Company.....	19 Hudson St., Buffalo, N. Y.....	Humbersone Tp.
Erb, John.....	R.R. No. 2, Zurich.....	Zurich.
Farris, Chas. S.....	R.R. No. 1, Glencoe.....	Mosa Tp.
Ferguson, Richard W.....	72 Pearl St. W., Brockville.....	Leeds Co.
File, Secord.....	43 Port St., Brantford.....	Lynden.
Flowers, W. T.....	Caledonia.....	Caledonia.
Forrester, Wm. E.....	Morewood.....	Winchester Tp.
Fraser, S. A.....	R.R. No. 1, Arnprior.....	Arnprior.
Frid Bros., Limited.....	Main West and Macklin Sts., Hamilton.....	Hamilton.
Frost, Clarence.....	R.R. No. 2, Denfield.....	Denfield.
Fuller Gravel Limited.....	402 Harbour Bldg., Toronto.....	Fuller.
Gabel, Arthur.....	R.R. No. 3, Zurich.....	Hay Tp.
Gear, H.....	Erin.....	Erin.
Gibson, Jim.....	R.R. No. 3 Walton.....	Morris Tp.
Gofton, Jacob.....	R.R. No. 3, Bright.....	Blenheim Tp.
Goodreau, Chas.....	R.R. No. 6, Thamesville.....	Chatham Tp.
Gray, Wm.....	R.R. No. 2, Blythe.....	Morris Tp.

Sand and Gravel—Continued

Name	Address	Location
<i>ONTARIO—Continued</i>		
Gregory, Milton	Kirkton	Huron Co.
Greenburn Sand and Gravel Company, Limited	331 Bay St., Toronto	Greenburn.
Hall, R. Reece	Box 115, Parry Sound	MacDougall Tp.
Halliburton, John, and Sons	101 Strange St., Guelph	Guelph Tp.
Halpenny, Lewis E.	R. R. No. 4, Arthur	Arthur Tp.
Harbour Brick Company, Limited	Fleet St., Toronto	
Hardie, J. T.	Princeton	Blenheim Tp.
Harper, Emerson	R. R. No. 1, Elora	Wellington Co.
Higgs, Thos. H.	Riverside Drive, London	London Tp.
Hill, John D.	R. R. No. 6, Woodstock	East Iona.
Hinde Bros.	134 Northland Ave., Mt. Dennis	York Tp.
Hoffman, Walter	R. R. No. 2, Mount Forest	Mount Forest.
Hogg, Robt. W.	R. R. No. 1, Wingham	Huron Co.
Home, Percy	Dungannon	Huron Tp.
Hopkins, R. G.	220 Chester St., London	Manor Park.
Howard, F. H.	Aldershot	Flamboro Tp.
Hydro-Electric Power Commission of Ontario	190 University Ave., Toronto	Hydro.
Irwin, Wm. H.	Lucknow	Lucknow.
Jago Concrete Products Company	Summerville	Toronto Tp.
Jewett, D.	Bluevale	Bluevale.
Johnston, G. F.	R. R. No. 2, Wilton Grove	Westminster Tp.
Johnston, Harvey C.	R. R. No. 2, Blyth	Huron Co.
Keyes, S. W.	R. R. No. 8, Woodstock	Woodstock.
Kilbourne, H. and Son	145½ Wharnccliffe Rd. S., London	Westminster Tp.
Kingston Penitentiary	Kingston	Portsmouth.
Kingston Sand and Gravel Company	183 William St., Kingston	Kingston Tp.
Klopp, Bert W.	R. R. No. 3, Zurich	Hay Tp.
Kyle, Thos.	R. R. No. 2, Hensall	Hay Tp.
Le Viness, S.	R. R. No. 3, Niagara Falls	Welland Co.
Lewis, Geo. Alfred	R. R. No. 2, Ailsa Craig	McGillivray Tp.
Lobb, W. H.	Clinton	Goderich Tp.
Lock, Bert	Thorndale	Middlesex Co.
Lockwood, D. B.	Delaware	Delaware Tp.
Lovelace, E. J.	St. Catharines	Welland Co.
Lowe, S. G., and Son	R. R. No. 1, Leonard	Cumberland Tp.
MacEwen, Jno. L.	R. R. No. 1, Bluevale	Turnberry Tp.
Maclean, Andrew	R. R. No. 3, Monkton West	Grey Tp.
Maple Sand, Gravel and Brick Company	454 King St. W., Toronto	Maple.
McChandless, Wm	Alderton	Alderton.
McClymont and Logan	Varna	Huron Co.
McColl Bros.	R. R. No. 1, Rodney	Elgin.
McElwain, Chas. J.	Fordwich	Huron Co.
McIntosh, Hugh A.	Dunvegan	Dunvegan.
McKay, Fred H.	R. R. No. 2, Stratford	Perth.
McLeish, Mrs. Mary	R. R. No. 2, Parkhill	Parkhill.
McLellan, James L.	R. R. No. 2, Thamesford	Oxford Co.
McQuillen, William	Lucknow	Huron Co.
McQuinn, James	R. R. No. 2, Kenilworth	Wellington Co.
Meriam, John W.	R. R. No. 4, London	Westminster Tp.
Mintern, Michael	99 Mohawk St., Brantford	Brantford.
Moore, John	R. R. No. 1, Ailsa Craig	Middlesex Co.
Moore, Wm. Earl	R. R. No. 1, Walkers	Middlesex Co.
Murphy, William J.	Harrison's Corners	Cornwall Tp.
Nagle, Jos.	Dublin	Hibbert Tp.
Neber, Arthur	Dashwood	Dashwood.
Nevill, Thomas and Son	R. R. No. 5, Aylmer West	Elgin.
Newell, Herbert	R. R. No. 1, Aylmer	Elgin.
Page, Jacob	R. R. No. 3, Fenwick	Welland Co.
Park, Mrs. Jno. S.	Lucan	Biddulph Tp.
Peterborough, City of	133 Simcoe St., Peterborough	Peterborough.
Pollard, Chas.	R. R. No. 2, Brussels	Huron Co.
Ponsford, A. E., Estate of	605 Talbot St. St. Thomas	Yarmouth Tp.
Prior, G. L.	R. R. No. 4, St. Thomas	St. Thomas.
Putherbough Construction Co., Limited	Room 38, Bank of Toronto, London	London.
Quick, Chas. R.	101 Briscoe St., London	Manor Park.
Quigley's	317 Main St. E., Hamilton	Saltfleet Tp.
Quinn and Wilson	Fergus	West Garafraxa.
Ratcliffe, E. B., Limited	King St., Bartonville	Westworth District.
Rath, James	Putnam	North Dorchester Tp.
Regan and Blackburn	1550 Dufferin St., Toronto	Mt. Dennis.
Richard, John	Crediton	Stephen Tp.
Robinson, Wm. J.	R. R. No. 1, Crediton	Stephen Tp.
Ross, Geo. W.	R. R. No. 1, Stratford	North Easthope Tp.
Rudd, A. E.	Rockwood	Rockwood.
Salter, William S.	Wingham	East Wawanosh Tp.
Sanderson, Henry	Blyth	Huron Co.
Sarjeant Company, Limited	51 Dunlop St., Barrie	Barrie
Schearer, Wm	R. R. No. 1, Stratford	North Easthope Tp.
Scheerer, Conrad	R. R. No. 1, Stratford	North Easthope Tp.
Schell, Geo. H.	64 Francis St. N., Kitchener	Kitchener.
Scott, Peter W.	R. R. No. 1, Belgrave	Wawanosh Tp.
Seebach, Ed.	R. R. No. 1, Sebringville	Ellice Tp.
Sellers, Joel H.	R. R. No. 5, Brussels	Huron Co.
Shelton, Russel A.	Ingersoll	Dereham Tp.
Sherman and Hubbell	R. R. No. 5, Thamesville	Camden Tp.
Shier, S. N.	Kingston	Usborne Tp.

Sand and Gravel—Continued

Name	Address	Location
ONTARIO—Concluded		
Shipley, Lionel J.	R.R. No. 2, Wilton Grove	Wilton Grove.
Skinner, R.	Exeter	Huron Co.
Skinner, Thos. V.	R.R. No. 1, Dresden	Camden Tp.
Smythe, C., Limited	11 King St., W. Toronto	Etobicoke Tp.
Sovier, Herb.	R.R. No. 1, Auburn	Auburn.
Spence, Jas.	R. R. No. 1, Komoka	Middlesex Co.
Sprackett, Percy P.	R.R. No. 6, Belleville	Hastings Co.
Spratt, J. H.	Billings Bridge	Russel Co.
Stevens, J. H.	Box 211, Stoney Creek	Stoney Creek and Capetown.
Stewart, Fenwick	R. R. No. 5, Clinton	Stanley Tp.
Stoner, Elmer	R.R. No. 4, Tillsonburg	Middleton Tp.
Sulley, W. J.	Courtice	Durham.
Sutherland, Hugh A.	R.R. No. 4, Embro	Oxford Co.
Tack, Henry	London	London Tp.
Taylor, Wm.	R.R. No. 2, Lucknow	West Wawanosh Tp.
Thompson, H. J.	R.R. No. 4, Clinton	Goderich Tp.
Uptigrove, Geo. D.	R.R. No. 1, Byron	Westminster Tp.
Vallery, Frank	Box 107, Belwood	West Garafraxa.
Wagstaffe, Percy D.	Glen Williams	Esqueving Tp.
Walsh, W. J.	Leonard	Leonard.
Waterford Sand and Gravel Co., Limited	402 Harbour Bldg., Toronto	Waterford.
Wilks, George	26 Railway St., Woodstock	Woodstock.
Wilton, Hervey	985 Bridge St., Niagara Falls	Stamford Tp.
Wilson, M.	R.R. No. 1, Maple	Vaughan Tp.
Windsor Sand and Gravel Co., Limited	30 Sandwich St., East Windsor	Essex Co.
Woodhull, Frank M.	R.R. No. 2, Komoka	Delaware Tp.
Workman, J. J.	R.R. No. 1, Drumbo	Blenheim Tp.
Wright and Co.	960 Queen St., Sault Ste. Marie	Algoma District.
Wylie, T.	R.R. No. 1, Wingham	Turnberry Tp.
Zavitz, Edgar M.	R.R. No. 2, Ilderton	Middlesex Co.
MANITOBA—		
Brandon, City of	City Hall, Brandon	Brandon.
Building Products and Coal Co., Limited	Christie St., Winnipeg	Woodlands.
Cumming and Dobbie	233-9th St., Brandon	Brandon.
Cusson, J. A.	379 rue Desautels, St. Boniface	St. Anne des Chênes.
Greater Winnipeg Water District	Winnipeg	G. W. W. D. Railway.
Lake Bar Sand and Gravel Company	Water St., Winnipeg	Lockport.
Manitoba Dept. of Highways	Winnipeg	
Marion Brick Co.	Box 30, St. Boniface	Shoal Lake.
McCurdy Supply Co., Limited	136 Portage Ave., Winnipeg	Birds Hill.
North West Gravel and Coal Co., Limited	604 Great West Perm. Bldg., Winnipeg	Springfield.
Riley, W. J.	Molson	Molson.
Rosser, Municipality of	Rosser	Rosser.
Sinnett, S. J.	St. Ouens	St. Ouens.
Winnipeg City, Hydro Electric System	55 Princess St., Winnipeg	Between Lac du Bonnet and Pointe du Bois.
SASKATCHEWAN—		
Mackenzie Supplies Limited	Box 107, Regina	Pilot Butte.
North Battleford, City of	City Hall, North Battleford	North Battleford.
Prince Albert, City of	City Hall, Prince Albert	Prince Albert.
Saskatchewan Dept. of Highways	Regina	
ALBERTA—		
Alberta Dept. of Highways	Edmonton	
Cristall Sand	10209-103 St., Edmonton	Perryvale.
Huff Gravel Limited	708 Tegler Bldg., Edmonton	Heatherdown.
Nanton, Town of	Nanton	Nanton.
Spoke, J. C.	Perryvale	Perryvale.
Sutherland, Moses C.	Olds	Olds.
BRITISH COLUMBIA—		
Armstrong, Corporation of City	Armstrong	Vernon Mining Division.
Britannia Sand and Gravel Co., Limited	1901 West Georgia St., Vancouver	Britannia Beach.
British Columbia Dept. of Highways	Victoria	
B.C. Sand and Gravel Co., Limited	404 Hall Bldg., Vancouver	Keith R., North Vancouver.
Burnaby, Corporation of	Edmonds	Barnaby Municipality.
Cascade Rock and Gravel Co., Limited	False Creek, Vancouver	Seymour Indian Reserve.
Chilliwack, City of	Chilliwack	Chilliwack Tp.
Consolidated Mining and Smelting Co. of Canada, Limited	Drummond Bldg., Montreal, Que.	Tadanae.
Deeks Sand and Gravel Company, Limited	101 1st Ave. W., Vancouver	Seymour Creek and Pt. Coquitlam.
Fernie, Corporation of City	City Hall, Fernie	Kootenay District.
Freshwater Sand and Gravel Company, Limited	902 Colombia St. W., New Westminster	West Bank Fraser River.
Gilley Bros., Limited	902 Colombia St. W., New Westminster	Fraser River.
Hillside Sand and Gravel Limited	1075 Main St., Vancouver	Howe Sound.
Johnston and Company, Limited	Box 250, Kamloops	Knutsford.
Kamloops, Corporation of City	Kamloops	Kamloops.
Kaslo, Corporation of City	Kaslo	Kootenay District.
Mitchell, Mrs. M. E.	Quathiaski Cove	Comox District.
Nelson, Corporation of City	City Hall, Nelson	Kootenay District.

Sand and Gravel—Concluded

Name	Address	Location
BRITISH COLUMBIA—Continued		
Pacific Engineers Limited, and Henry and McFee Contracting Co., Inc.	1044 Beach Ave., Vancouver.....	Near Bridge River.
Pioneer Sand and Gravel Company, Limited....	Industrial Reserve, Victoria.....	Esquimalt District.
Port Alberni, Corporation of City.....	Box 98, Port Alberni.....	Alberni Municipality.
Port Coquitlam, City of.....	Port Coquitlam.....	Port Coquitlam.
Prince George, Corporation of City.....	Drawer 42, Prince George.....	Prince George.
Prince Rupert, Corporation of City.....	City Hall, Prince Rupert.....	Prince Rupert.
Producers Sand and Gravel Co., Limited.....	1902 Store St., Victoria.....	Esquimalt District.
Revelstoke, Corporation of City.....	Revelstoke.....	Sec. 27, Tp. 23, R. 2, M. 6.
Slocan, Corporation of City.....	Slocan.....	Slocan.
Swinerton, Musgrove and Wilson, Estate of.....	640 Fort St., Victoria.....	Metchosin.
Trail, City of.....	Trail.....	Trail.
Vancouver Island Power Company, Limited.....	1016 Langley St., Victoria.....	Renfrew District.

STONE QUARRYING INDUSTRY

Granite

NOVA SCOTIA—		
Bower, A. R.....	Shelburne.....	Shelburne.
Department of Highways.....	Halifax.....	Beech Hill.
Hoyt, C. M.....	Middleton.....	Nictaux West.
Queensport Granite Co., Ltd.....	P.O. Box 498, Sydney.....	Queensport.
Rice, E. A. and O. A.....	Lawrencetown.....	Nictaux West.
Rice, W. D.....	Middleton.....	Nictaux West.
NEW BRUNSWICK—		
Foundation Company of Canada, Ltd.....	1538 Sherbrooke St. W., Montreal, Que.....	Dalhousie.
Granite Street Pavement Co., Ltd.....	Hampstead.....	Hampstead.
McGrattan & Sons, Ltd.....	Wallace St., St. George.....	Charlotte Co.
Milne Courts and Co., Ltd.....	St. George.....	St. George.
Meating Epps Co., Ltd.....	St. George.....	St. George.
Mooney, B., and Sons, Ltd.....	112 Queen St., St. John.....	Spoon Island.
O'Brien and Baldwin.....	St. George.....	St. George.
QUEBEC—		
Alcoa Power Co., Ltd.....	Box 620, Kenogami.....	Racine.
Angers and Noel Co., Ltd.....	Chicoutimi.....	Chicoutimi.
Baillargon and Côté.....	264 rue Champlain, St. Jean.....	St. Luc.
B. and R. Granite Quarry.....	Beebe.....	Beebe.
Beebe White Granite Co., Ltd.....	Beebe.....	Stanstead Co.
Bergeron, Jos.....	18-1st Ave., Shawinigan Falls.....	Champlain Co.
Bergeron, Pitre.....	Chicoutimi Ouest.....	Chicoutimi.
Bernier, Auguste.....	Box 491, Roberval.....	Roberval.
Berubé, Lucien, and Fils.....	Brownsburg.....	Brownsburg.
Blackburn and Larouche.....	81 rue Ste. Anne, Chicoutimi.....	Chicoutimi.
Brodie's Limited.....	1070 Bleury St., Montreal.....	Stanstead, Iberville and Labelle Cos.
Brunet, Joseph.....	663 Chemin Côte des Neiges, Montréal.....	Chatham.
Carrières Frontenac Ltée.....	St. Sébastien.....	St. Sébastien.
Chicoutimi, Cité de.....	Chicoutimi.....	Chicoutimi.
Cloutier Bros.....	Beebe.....	Beebe.
Compagnie de Granit Plamondon Ltée.....	rue Wellington, Sherbrooke.....	Compton Co.
Delwaide and Goffin.....	12 rue du Havre, Chicoutimi.....	Chicoutimi.
Department of Highways.....	Parliament Bldg., Quebec.....	
Desrosiers, Albert.....	Beebe.....	Stanstead Tp.
Dumas, Arthur.....	Rivière à Pierre.....	Rivière à Pierre.
Dumas, Auguste.....	Rivière à Pierre.....	Rivière à Pierre.
Grand Mère, Cité de.....	Grand Mère.....	Grand Mère.
Granit Noir du Lac St-Jean, Ltée.....	105 Côte de la Montagne, Québec.....	Roberval.
Grenier, Elie.....	Glenada, Cté St. Maurice.....	Glenada, Cté St. Maurice.
Gingras and Frère, Ltée.....	St. Marc des Carrières.....	Stanstead Co.
Guenette Granite Co., Ltd.....	Guenette, Labelle Co.....	Labelle Co.
Haselton, W. M.....	Beebe.....	Stanstead Co.
Hébert, O.....	Ville Marie.....	Ville Marie and Laverlochère.
House Hill Granite Co., Ltd.....	Beebe.....	Stanstead Co.
Lacasse and Boulais.....	Box 23, Beebe.....	Stanstead Tp.
Lavoie, Doyer, Enrg.....	Rousseaus' Mill.....	Montauban Tp.
McIntosh, Robert.....	Beebe.....	Stanstead Co.
Moreau, Polycarpe.....	Roberval.....	St. Dominique.
Morrow and Beatty, Ltd.....	Box 782, Peterborough, Ont.....	Pontiac Co.
Perron, Stanislas.....	Rivière à Pierre.....	Rivière à Pierre.
Riverin, Riverin, Enrg.....	39 rue Montcalm, Chicoutimi.....	Rivière du Moulin.
Rivière à Pierre Granite, Ltd.....	Rivière à Pierre.....	Bois Co.
Robertson and Janin Paving Co., Ltd.....	1460 Sherbrooke St. W., Montreal.....	Montreal et Chicoutimi.
Rockland Crushed Stone Co., Ltd.....	1465 Bleury St., Montreal.....	Outremont.
Scotstown Granite Co., Ltd.....	Scotstown.....	Compton Co.
Séguin, Georges.....	Beebe.....	Stanstead.
Shawinigan Engineering Co., Ltd.....	107 Craig St. W., Montreal.....	Champlain and Maskinonge Cos.

Granite—Concluded

Name	Address	Location
QUEBEC—Concluded		
Silver Granite Co., Ltd.	117 Côte d'Abraham, Québec	Frontenac Co.
Stanstead Granite Quarries Co., Ltd.	Beebe	Stanstead Co.
St. Bruno Quarry Co., Ltd.	6418 St. Hubert, Montreal	St. Bruno
Thibaudeau and St. Pierre	Rivière à Pierre	Rivière à Pierre
Tremblay, Joseph Xavier	Baie St. Paul	Baie St. Paul
Voyer, F., and Frère	Rivière à Pierre	Rivière à Pierre
Wilkinson, Frank L.	Beebe	Stanstead
ONTARIO—		
Beresford, John	Gananoque	Gananoque
Code, W. Harry	26 Cornelia St., Smiths Falls	Leeds Tp.
Fort William, Corporation of the City of	City Hall, Fort William	Fort William
Gordon Granite Co.	239 Confederation Life Bldg., Toronto	Gananoque
Grenville Crushed Rock Co., Ltd.	917 Keefer Bldg., Montreal	Hawk Lake
Hall, R. Reece	Parry Sound	Parry Sound
Hokanson, Swan	Box 653, Gananoque	Gananoque
Horne, Wm.	Suite M, Ashford Bldg., Winnipeg	Butler
Hydro-Electric Power Commission of Ontario	190 University Ave., Toronto	Hydro.
McKee Bros.	R.R. No. 3, Lansdowne	Leeds Co.
Mills and Kenniston	Gananoque	Gananoque
Ontario Rock Co., Ltd.	1501 Canada Permanent Bldg., Toronto	Tp. Belmont and Methuen
Peninsula Granite Quarries, Ltd.	Peninsula	Peninsula
Quinn Stone and Ore Co.	Duluth, Minnesota	Fort William
BRITISH COLUMBIA—		
B.C. Monumental Works Ltd.	199-8th Ave. E., Vancouver	Granite Island
Cascade Rock and Gravel Co., Ltd.	653 Taylor St., Vancouver	Burrard Inlet
Coast Quarries Ltd.	930-1, Marine Bldg., Vancouver	Burrard Inlet
Gilley Bros., Ltd.	902 Columbia St. W., New Westminster	Coquitlam
Grand Forks, Corporation of the City of	Grand Forks	Grand Forks
Huchcroft, J. F.	Box 54, Cranbrook	Fort Steele
Nelson Granite and Monumental Co.	Box 855, Nelson	Nelson
Prince Rupert, City of	City Hall, Prince Rupert	Prince Rupert
Vancouver Granite Co., Ltd.	543 Granville St., Vancouver	Nelson Island
Vernon Granite and Marble Co.	Okanagan Landing	Yale Dist.
Western Granite Co., Inc.	1005 Lloyd Bldg., Seattle, Wash.	Ymir, Kootenay Dist.
Wilson, James S.	Sirdar	Sirdar

Limestone

NOVA SCOTIA—		
Brandram-Henderson Ltd.	Montreal, Que.	Whycocomagh.
Dom. Steel and Coal Corpn. Ltd., D.I. and S. Division	Sydney	Point Edward, Cape Breton.
Eastern Lime Co., Ltd.	Windsor	Windsor
Mersey Paper Co., Ltd.	Liverpool	East River
Ross and MacLellan	Iron Rock	Iron Rock
NEW BRUNSWICK—		
Brookville Mfg. Co., Ltd.	Brookville	Brookville
Peters, C. H., and Sons, Ltd.	107 Prince William St., St. John	Torryburn
QUEBEC—		
Bathurst Power and Paper Co., Ltd.	Bathurst, New Brunswick	Port Daniel
Beaudry, J. Pitre	rue Taché, Joliette	Joliette
Canada Cement Co., Ltd.	Canada Cement Bldg., Montreal	Hull
Canada Lime and Stone Ltd.	St. Marc des Carrières	St. Marc
Carrière Cap St. Martin	Cap St. Martin	Cap St. Martin
Carrière De Sales Ltée	Room 310-10 St. James St., W., Montreal	St. François de Sales
Carrière Giffard, Ltée	Giffard	Giffard
Carrière St. Louis	St. Louis	Rang Ste. Marguerite
Carrière St. Maurice	57 rue Alexandre, Trois Rivières	Champlain Co.
Charron, Arthur	Village Bélanger	Cap St. Martin
Château Richer Quarry Ltd.	Château Richer	Château Richer
Clercs de St. Viateur	1145 Ave. St. Viateur, Outremont	Joliette
Cousineau, Alderic	5697 St. Urbain, Montréal	Montréal
Delorimier and Rogers Quarries Ltd.	4901 Iberville, Montréal	Montréal
Department of Highways	Parliament Bldg., Québec	
Deschambault Quarry Corporation	52 rue St. Paul, Québec	St. Marc des Carrières
Dominion Lime Co.	East Angus	Lime Ridge
Doré, Raoul	Pointe aux Trembles	Pointe aux Trembles
Dufresne Construction Co., Ltd.	1832 Blvd. Pie IX, Montreal	Laval Co.
Durocher, Cyrille	11021 Notre Dame Est., Montréal	Montréal East
Duquette et Biron Ltée	801 Lacordaire, Montreal	Ville St. Michel
Faubert, Alphonse	Ville de Lery, Chateauguay Co.	Chateauguay Co.
Filion, Adelard	Lachute	Lachute
Fortin, Camille	Chambord	Chambord

Limestone—Continued

Name	Address	Location
QUEBEC—Concluded		
Fuger and Smith Ltd.	78 Victoria Ave., Pointe Claire	Pointe Claire.
Gagnon, Martin	7794 St. André, Montréal	Montréal.
Gaspesian Fertilizer Co.	Port Daniel East	Port Daniel East.
Gauthier, Olivier	St. Marc des Carrières	St. Marc des Carrières.
Gingras et Frère, Ltée	St. Marc des Carrières	St. Marc des Carrières.
Giroux, F. X. R.	St. Louis de Courville	St. Louis de Courville.
Gravel, Ed. L.	Château Richer	Château Richer.
Guilbault Frères et Co., Inc.	Ste. Elizabeth	Ste. Elizabeth.
Kennedy Construction Co., Ltd.	407 McGill St., Montréal	St. François de Sales, Acton Vale
Lacoulaine, T.	Château Richer	Château Richer.
Lagacé, Napoléon	St. Martin, Cté Laval	St. Martin.
Lapointe, Emile	St. Dominique	St. Dominique.
Lapointe, Joseph	12,034 Lachapelle St., Montréal	Cartierville.
Laval Quarry Co., Ltd.	6418 St. Hubert St., Montréal	Cap St. Martin.
Leclerc, Edouard	St. Joachim	St. Joachim.
Leclerc, T.	8346 Henri-Julien St., Montréal	Cap St. Martin.
Levesque, Armand	Roberval	Roberval.
Maisonneuve Quarry Co., Ltd.	4740 Iberville St., Montréal	Rosemont.
Martineau, O., et Fils, Ltée	517 Est rue Marie-Anne, Montréal	Montréal and St. Marc des Carrières.
Matthew Devito Construction Ltd.	6138 Hamilton St., Montréal	Pointe Claire.
McCarthy, W. A., and Co.	104 St. John St., Quebec	Château Richer.
Mercure, Camille	9 rue St. Denis, St. Hyacinthe	St. Dominique.
Miner, R. H., Co., Ltd.	7411 de Lanaudière St., Montréal	St. Laurent.
Montréal Cottons Ltd.	Valleyfield	Valleyfield.
Montréal Quarry Ltd.	1340 rue Bellechasse, Montréal	Montréal.
National Quarries Ltd.	411 Canada Cement Bldg., Montréal	Laval Co.
Noël, Oscar	41 Leduc St., Hull	Wrightville.
Page, Jos.	Charlesbourg Ouest	Charlesbourg Ouest
Paquette, Damien	Village Belanger	Laval Co.
Paquette, Levis et Cie	Cap St. Martin	Laval Co.
Quarries Ltd.	Confederation Bldg., Montréal	Laval Co.
Schlague, Wilfrid	309 Bord du Lac, Pointe Claire	Pointe Claire.
Shawinigan Chemicals Ltd.	83 Craig St. W., Montréal	St. Damien de Stanbridge Tp.
Standard Clay Products Ltd.	Box 819, St. Johns	St. Johns.
Standard Lime Co., Ltd.	Joliette	St. Marc. des Carrières et St. Paul de Joliette.
St. George Cartage and Construction Co., Ltd.	4820-4th Ave., Rosemont, Montréal	Soulanges Co.
St. Laurent Quarry Ltd.	Cap St. Martin	Cap St. Martin.
St. Michel Quarry Ltd.	St. Michel de Laval	St. Michel de Laval.
St. Vincent de Paul Penitentiary (Dept. of Justice)	Ottawa, Ont.	St. Vincent de Paul.
Stone and Quarry Ltd.	1340 rue Bellechasse, Montréal	St. François de Sales.
Theoret, Maglaire	Valleyfield	Valleyfield.
Tremblay, Napoléon	Avenue Joffre, Hull	Hull.
Union Quarry Ltd.	1340 rue Bellechasse, Montréal	Laval Co.
Valleyfield City	Valleyfield	Valleyfield.
Varin and Barbin Ltd.	Box 26, Ville St. Michel	Ville St. Michel.
Villeray Quarry Co., Ltd.	4740 Iberville St., Montréal	Montréal.
Wright Builders Supply Ltd.	250 Catherine St., Ottawa	Hull.
ONTARIO—		
American Cyanamid Co.	535-5th Ave., New York, U.S.A.	Beachville.
Bourgie, J. B.	Embrun	Russell.
Brulé, E. D., and Sons, Ltd.	Hogs Back, Billings Bridge	Billings Bridge.
Brunner Mond, Canada, Ltd.	501 Dominion Bank Bldg., Toronto	Anderdon Tp.
Canada Cement Co., Ltd.	Canada Cement Bldg., Montréal, Que.	Thurlow Tp.
Canada Crushed Stone Corp., Ltd.	76 Sun Life Bldg., Hamilton	Wentworth Co.
Cartmell, Ellen, Estate of	Box 383, Thorold	Thorold.
Cloutier and Grenon	Casselman	Cambridge Tp.
Coldwater Crushed Stone Ltd.	Coldwater	Simcoe.
Cook, J. S.	Wiaraton	Wiaraton.
Dibblee Construction Co., Ltd.	1417 University Tower, Montréal, Que.	Kemptville, Carleton Co., Grenville Co.
Dufferin Construction Co.		
Foster, R. R.	86 Spadina Ave., Ottawa	Ottawa.
Gordon Crushed Stone Co., Ltd.	239 Confederation Life Bldg., Toronto	Haldimand Co.
Grant Bros. Construction Co., Ltd.	352 Bank St., Ottawa	Elizabethtown Tp. and Kapuskasing.
Grenville Crushed Rock Co., Ltd.	Oxford Mills P.O.	Oxford Tp.
Gypsum Lime and Alabastine Canada, Ltd.	Paris	Milton.
Hagersville Contracting Co., Ltd.	76 Sun Life Bldg., Hamilton	Walpole Tp.
Hagersville Quarries Ltd.	Box 280, Hagersville, Ont.	Walpole Tp.
Henniger, M. G.	Box 886, Smith Falls	Drummond Tp.
Huffman Construction Co., Ltd.	331 Bay St., Toronto	Wentworth Co.
Humberstone, Township of	% A. J. Babion, Reeve R. 1, Humberstone	Wainfleet R. 1.
Innerkip Quarries Ltd.	Fleet St. at Bathurst, Toronto	East Zorra Tp.
Irvine, Edgar, Co., Ltd.	Main St., Alexandria	Prescott Co.
Johnson Bros., Co., Ltd.	43½ Market St., Brantford	Stormont Co.
Kingdon Mining, Smelting and Mfg. Co.	314 Beaver Hall Hill, Montréal, Que.	Galetta.
Kingston Penitentiary	Portsmouth	Portsmouth.
Kirkfield Crushed Stone, Ltd.	Fleet St. at Bathurst, Toronto	Kirkfield.
Lapierre, M. C.	1994-9th Ave. E., Owen Sound	Owen Sound.

Limestone—Concluded

Name	Address	Location
ONTARIO—Concluded		
Law Construction Co., Ltd.	225 Sterling Road, Toronto	Owen Sound.
Limestone Products Ltd.	1104 Hermont Bldg., Toronto	North Orillia Tp.
Longford Crushed Stone Ltd.	Box 198, Orillia	Orillia.
MacDonald, A. N.	Box 67, Bronte	Bronte.
McGinnis and O'Connor	Kingston	Barriefield Hill.
McQuigge, J. R.	Arnprior	Russell Co.
Middleton, J. N.	Ancaster	Ancaster.
Nelson Crushed Stone	Nelson	Nelson.
Noranda Mines, Ltd.	804 Royal Bank Bldg., Toronto	Haileybury.
Ontario Reformatory of Guelph	Dept. Prov. Sec'y., Parliament Bldg., Toronto	Guelph Tp.
Owen Sound City—Board of Works Dept.	City Hall, Owen Sound	Owen Sound.
Pembroke, Town of	Pembroke	Pembroke.
Parson, John	Stevensville	Stanford Tp.
Puslinch Quarry Ltd.	76 Sun Life Bldg., Hamilton	Puslinch Tp.
Queenston Quarries Ltd.	76 Sun Life Bldg., Hamilton	Niagara Tp.
Quinton, W. G.	Jasper	Jasper.
Robillard, H., and Son.	195 Nicholas St., Ottawa	Gloucester Tp.
Roddy, J. M.	293 Division St., Kingston	Kingston.
Rootly, H. T.	21 Dundas Square, Toronto 2	Grenville and Wellington Cos.
Standard Quarries Ltd.	441 Confederation Life Bldg., Toronto	Grantham Tp.
St. Catharines Stone Quarry	195 Queenston St., St. Catharines	St. Catharines.
Walker Bros., Ltd.	Box 586, Thorold	Welland Co.
Wallace, R., and Son.	142 Patrick St., Kingston	Kingston.
Wehman, John	251 Division St., Kingston	Kingston.
Welland Ship Canal	St. Catharines	St. Catharines.
Wentworth Quarries Ltd.	76 Sun Life Bldg., Hamilton	Saltfleet Tp.
Wickett, James A., Ltd.	16 Saulters St., Toronto	Tyendinaga Tp.
Wilford, F. R., and Co., Ltd.	Box 119, Lindsay	Nottawasaga Tp.
Windmill Point Crushed Stone Co., Ltd.	225 Sterling Road, Toronto	Ridgeway.
MANITOBA—		
Gillis Quarries Ltd.	Richard and Spruce St., Winnipeg	Garson.
Moosehorn Lime Co., Ltd.	812 Boyd Bldg., Winnipeg	Moosehorn.
Tyndall Quarry Co., Ltd.	1591 Erin St., Winnipeg	Garson.
Western Stone Co., Ltd.	205 Confederation Life Bldg., Winnipeg	Garson.
Winnipeg, City of	City Hall, Winnipeg	Stoney Mountain.
Winnipeg Supply and Fuel Co., Ltd.	812 Boyd Bldg., Winnipeg	Stonewall.
ALBERTA—		
Summit Lime Works	Box 273, Lethbridge	Lethbridge.
BRITISH COLUMBIA—		
Consolidated Mining and Smelting Co.	Trail	Kimberley.
Department of Highways		
Nelson Island Lime Co., Ltd.	415 Pacific Bldg., Vancouver	Blind Bay.
Pacific Lime Co., Ltd.	744 Hastings St., N. Vancouver	Blubber Bay.
Powell River Co., Ltd.	Powell River	Texada Island.
Priore and Bannuchi	Trail	Fife.
Rosebank Lime Co.	602 Pacific Bldg., Vancouver	Esquimalt.
Trail, City of	Trail	Trail.
Walleen and Sundvall	Port Alice	Quatsino Sound.
Western Lime Products Co., Inc.	91 Spring St., Seattle, Wash., U.S.A.	Blubber Bay.

Marble

QUEBEC—		
Brassard, Ovide	L'Annonciation	L'Annonciation.
Wallace Sandstone Quarries, Ltd.	132 St. James St., Montreal	Phillipsburg.
White Grit Co.	Hurdman's Road, Ottawa, Ont.	Portage du Fort.
ONTARIO—		
Balender Bros.	Haliburton	Haliburton.
Bonter, Fred and John, and Co.	Marmora	Marmora Tp.
Crystalite Products Ltd.	Paris	Hastings Co.
Wright, Walter S., and Sons	Haleys P.O., R.R. No. 1	Renfrew C.
MANITOBA—		
Hudson Bay Marble and Granite Quarries Ltd.	The Pas	Near The Pas.
Manitoba Marble Quarries Ltd.	408 McArthur Bldg., Winnipeg	Cormorant.
Winnitoba Marble Co.	1180 Wall St., Winnipeg	Hodgson.
BRITISH COLUMBIA—		
Beale, F. J.	Bella Bella	Cunningham Island.
B.C. Refractories, Ltd.	660 Taylor St., Vancouver	Beales Bay.
Canadian Marble and Granite Works Ltd.	10702-101st St., Edmonton, Alta.	Marblehead.

Sandstone

Name	Address	Location
NOVA SCOTIA—		
Department of Highways.....	Halifax.....	Upper Sackville.
Fairview Crushed Stone Co., Ltd.....	Fairview, Halifax.....	Halifax.
Wallace Sandstone Quarries Ltd.....	132 St. James St., Montreal, Que.....	Cumberland Co.
NEW BRUNSWICK—		
Dobson, Frank L.....	Dorchester.....	Beaumont.
Miramichi Quarry Co., Ltd.....	Quarryville.....	Quarryville.
Nelson Bros.....	Lower Cape.....	Curryville.
QUEBEC—		
Beauharnois Construction Co.....	1620 University Tower, Montreal... 10 Ave. Mont Marie, Lévis.....	Beauharnois. St. Louis Pintendre and St. Nicholas.
Bourbonnais, J. A.....	Vaudreuil Station.....	Vaudreuil.
Canadian Rock Products Ltd.....	2020 Union Ave., Montreal.....	Montmagny Co.
Citadel Brick Ltd.....	14 St. Joseph St., Québec.....	Boischatel.
Cloutier, Emile.....	Trois Saumons.....	Monument de l'Islet.
Department of Roads.....	Parliament Bldg., Québec.....	
Gagnon Louis-Philippe.....	St. David, Lévis.....	St. David.
Ottawa Silica Supply Co.....	East Templeton.....	East Templeton.
Sherbrooke City.....	Box 754, Sherbrooke.....	Ascot Tp.
Vezina, Jos., Enrg.....	Ste. Foye.....	Ste. Foye.
ONTARIO—		
Credit Valley Quarries Ltd.....	C.N.R., Florence St., Toronto 3.....	Glen Williams.
Danforth Quarry Ltd.....	736 Danforth Ave., Toronto.....	Toronto.
Danforth Stone Supply Co., Ltd.....	736 Danforth Ave., Toronto.....	Toronto.
Logan, Hugh.....	Glen Williams.....	Glen Williams.
ALBERTA—		
Oliver, Wm.....	1823-16th St. W., Calgary.....	Calgary.
BRITISH COLUMBIA—		
McDonald, J. A. and C. H., Ltd.....	1571 Main St., Vancouver.....	Haddington Island and Newcastle.

Slate

BRITISH COLUMBIA— Kennedy and Holland.....	Sooke Lake P.O.....	Leechtown.
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APPENDIX ONE

EXPLANATORY NOTES

Method of Computing Quantities and Values of the Mineral Production of Canada in 1930.

Antimony.—Recoverable metal in shipments made valued at the average New York price for fine metal.

Arsenic.—(a) Recoverable arsenic in concentrates exported at an arbitrary value; (b) white arsenic shipped from Canadian smelters at its sales value.

Bismuth.—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining at an arbitrary value; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

Cadmium.—Smelter production valued at the average New York price for the year.

Cobalt.—Cobalt content of the various cobalt products sold by Ontario smelters added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Copper.—(a) Recoverable copper in ores and concentrates exported valued at the average New York price for the year. (b) Copper in blister copper made by British Columbia, Manitoba and Quebec smelters, valued at the average New York price for the year. (c) Copper in blister copper made at Port Colborne, Ontario, valued pro rata according to the income from sales. (d) copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary rate agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

Gold.—Gold in bullion produced and the recoverable gold in all other Canadian mine products valued at the standard rate of \$20.671834 per fine ounce.

Iron Ore.—Export tonnages at sales value.

Lead.—(a) Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year, the English quotations being converted to Canadian funds at par (\$4.86666). (b) Sales from the smelter of the Kingdon Mining, Smelting and Manufacturing Co., Ltd., Galetta, Ontario.

Nickel.—(a) Refined and electrolytic nickel produced at Canadian refineries valued at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte).

Platinum group metals.—Recoverable metals in smelter products at their sales value to the producer and placer platinum at the average New York price for the year.

Silver.—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price for the refined metal.

Zinc.—Refined zinc produced by the Consolidated Mining and Smelting Co., Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co., Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London, exchange conversion being made at par.

Coal.—Output tonnage evaluated *pro rata* according to income from sales.

Other Non-Metallic Minerals, Clay Products and Structural Materials.—Shipments during the year at their respective sales values.

Imports.—Statements of quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The *price* and *value* of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country the currency of which is not substantially depreciated.

Exports.—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

Weight.—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression *ton* means 2,000 pounds, and *cwt.* 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

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MINING, METALLURGICAL AND CHEMICAL BRANCH DOMINION BUREAU OF STATISTICS

STATISTICS OF MANUFACTURES—based chiefly on minerals.

General reports on the sections of manufactures covered by the Mining, Metallurgical and Chemical Branch are issued as follows:—

Annual Printed Reports—

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Manufactures of Non-Ferrous Metals: Aluminium Products—Brass and Copper Products—Lead, Tin and Zinc Products—Jewellery and Silverware—Electrical Apparatus and Supplies—Miscellaneous Non-Ferrous Metal Products—Non-Ferrous Smelting and Refining.

Manufactures of Non-Metallic Minerals: Aerated Waters—Asbestos Products—Cement—Cement Products—Coke and Gas—Glass (blown, cut, ornamental, etc.)—Lime—Petroleum Products—Products from Domestic Clays—Products from Imported Clays—Salt—Sand—Lime Brick—Stone Dressing—Artificial Abrasives and Abrasive Products—Miscellaneous Non-Metallic Mineral Products, including (a) Artificial Graphite and Electrodes, (b) Gypsum Products, (c) Mica Products, (d) Magnesite Products, (e) Non-Metallic Products, n.e.s.

Chemicals and Allied Products: Coal Tar Distillation—Acids, Alkalies and Salts—Compressed Gases—Explosives, Ammunition and Fireworks—Fertilizers—Medicinal and Pharmaceutical Preparations—Paints, Pigments and Varnishes—Soaps and Washing Compounds—Toilet Preparations—Inks—Adhesives—Polishes and Dressings — Flavouring Extracts — Wood Distillation — Miscellaneous Chemical Products, including (a) Baking Powder, (b) Boiler Compounds, (c) Celluloid Products, (d) Insecticides, (e) Sweeping Compounds, (f) Disinfectants, (g) Matches, (h) Dyes and Colours, (i) Miscellaneous chemical products, n.e.s.

Annual Bulletins.—In addition to the foregoing printed reports, a series of bulletins is issued annually, each of which presents the principal statistics relative to production: (a) in a particular industry, e.g. Automobiles—Petroleum Products, etc., (b) in each of the four main groups of industries. These are published in mimeograph form from time to time during the year as the necessary material becomes available and provide advance information on these industries.

Monthly—

**Production of Pig Iron and Steel in Canada.
Coal and Coke Statistics for Canada.
Automobile Statistics for Canada.**

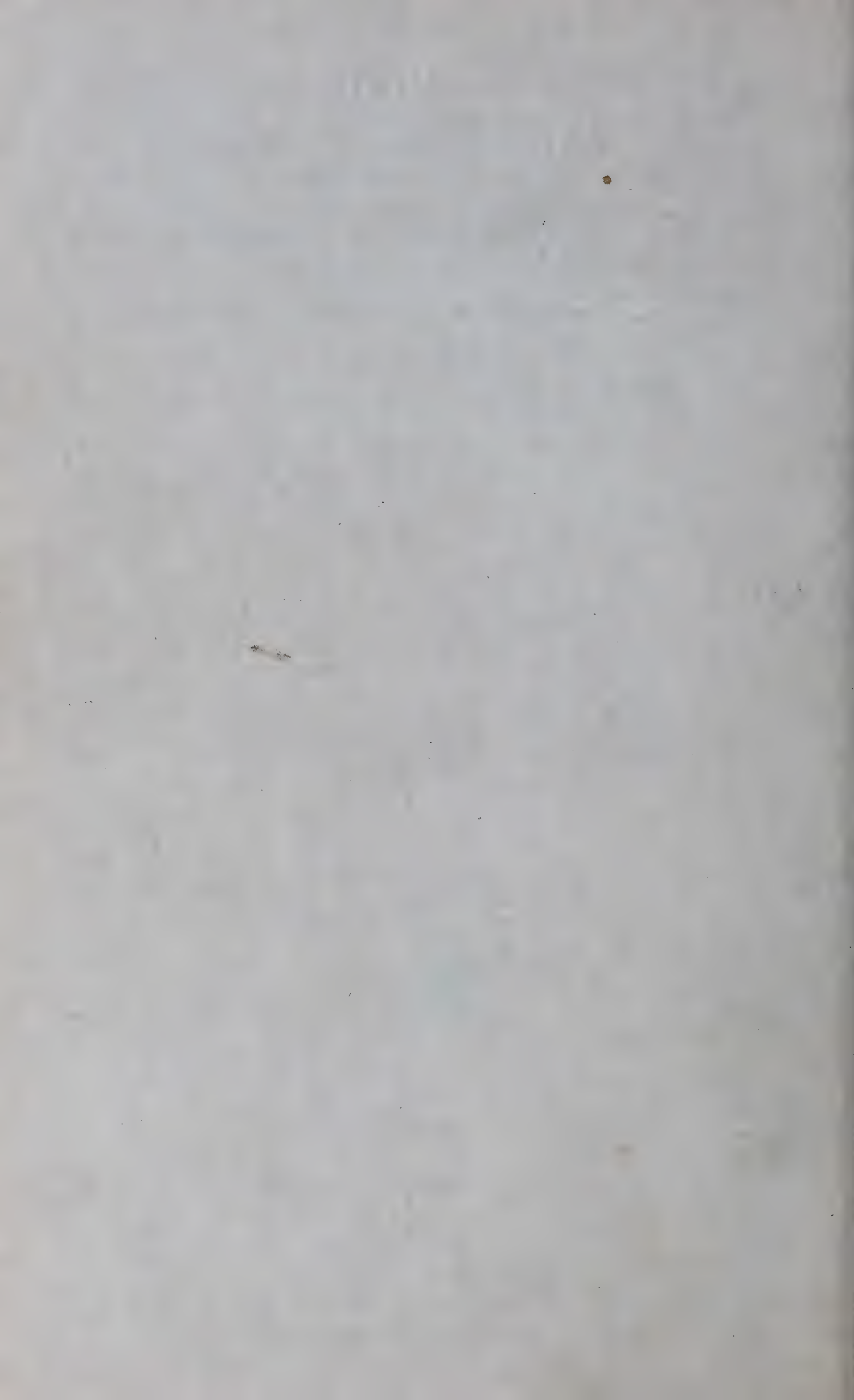
Quarterly—

Analysis of the Radio Industry in Canada.

SPECIAL REPORTS—

Report on the Consumption of Prepared Non-Metallic Minerals in Canada.
Report on the Consumption of Mine and Mill Materials in Canada.
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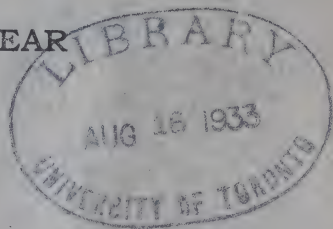
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CANADA—DEPARTMENT OF TRADE AND COMMERCE
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT
ON THE
MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR

1931



Published by Authority of the Hon. H. H. Stevens, M.P.,
Minister of Trade and Commerce



OTTAWA
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1933

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LIST OF PUBLICATIONS

PREPARED IN THE

MINING, METALLURGICAL AND CHEMICAL BRANCH DOMINION BUREAU OF STATISTICS

MINERAL PRODUCTION (Mining and Metallurgy).

General Reports—

Preliminary Reports (semi-annual) on the Mineral Production of Canada.

Monthly Reports on Canada's Leading Mineral Products.

Annual Report on the Mineral Production of Canada. (In one volume).

A comprehensive record of the mining industry embodying historical and world data, detailed information on mineral production, imports and exports for Canada and general statistics relative to the mining industry on capital investment, employment, fuel consumption and power equipment, arranged in 9 chapters, each dealing with a particular branch of the industry. Statistics on production and trade in mineral products appear in detail in the appropriate chapters. A list of operating companies with their office and plant addresses is included. Fully indexed. Chapter titles are: Canada—The Gold Mining Industry—The Silver Mining Industry—The Nickel-Copper Industry—Miscellaneous Metal Mining Industries—The Non-Ferrous Smelting and Refining Industry—The Coal Mining, Coke, Natural Gas, Peat and Petroleum Industries—Non-Metal Mining Industries (Other than Fuels)—The Clay Products and Other Structural Materials Industries—Notes on the Methods of Computing Values—Index.

Coal—

Monthly and Quarterly Reports on Coal and Coke Statistics for Canada.

A condensed report on production, imports and exports of coal and coke is issued monthly, publication being made about the twentieth of the next following month.

A more general review is published quarterly, showing statistics for each month, for the quarter, and for the year to date on the output by coal-mining districts and by provinces, imports and exports by ports and by kinds of coal, employment in coal mining, and tonnage lost. There is also a section on coke showing production, imports, exports, distribution and consumption by months and by provincial groups.

Annual Report on Coal Statistics for Canada.

Text and tables showing for Canada, and for each of the coal-producing provinces, historical and current data on output, tonnage lost, disposition of coal from the mines, domestic and foreign shipments, exports and imports by ports, consumption of coal, prices, employment, salaries and wages paid, power equipment, capital investment, etc.

ANNUAL BULLETINS—

Metals—The Gold Mining Industry in Canada which includes Alluvial Gold Mining, Auriferous Quartz Mining, Copper-Gold-Silver Mining, and tables showing Canadian and world production of Gold.—The Silver Mining Industry in Canada, which includes Silver-Cobalt-Arsenic Mining, Silver-Lead-Zinc Mining, and tables showing Canadian and world production of Arsenic, Cobalt, Lead, Silver and Zinc.—The Nickel-Copper Mining, Smelting and Refining Industry, which includes Canadian and world production of Nickel.—The Canadian and World Production of Copper.—Metals of the Platinum Group.—The Production of Miscellaneous Metals including Antimony, Beryl, Bismuth, Cadmium, Chromite, Lithium, Manganese, Mercury, Molybdenite, Radium, Selenium, Tin, Titanium, Tungsten.—The Non-Ferrous Smelting and Refining Industry.

Non-Metals—Abrasives—Asbestos—Coal—Feldspar—Gypsum—Iron Oxides—Mica—Natural Gas—Petroleum—Quartz—Salt—Talc and Soapstone—Miscellaneous Non Metallic Minerals including Actinolite, Barytes, Bituminous Sands, Fluorspar, Graphite, Magnesite, Bog Man ganese, Mineral Waters, Phosphate, Silica Brick, Sodium Carbonate, Sodium Sulphate, Sulphur (Pyrites).

Structural Materials—Cement—Clay and Clay Products—Lime—Sand and Gravel—Stone.

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DOMINION BUREAU OF STATISTICS
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NOTE ON STATISTICS OF PRODUCTION

In the collection of production data, the Dominion Bureau of Statistics makes a division between primary and secondary production. In the first-named class, there are separate sections for the collection of statistics on (a) **Agricultural Products**, (b) **Furs**, (c) **Fish**, (d) **Forest Products**, (e) **Mineral Products**.

In the second are included (a) **Manufacturing** and (b) **Construction**.

Manufacturing is subdivided into nine groups of industries, producing concerns being classified according to the principal component material of their major products. For example, manufactures of leather goods are classified under "Animal Products"; the pulp and paper industry under "Wood and Paper", etc. An outline of the scheme of classification in use for manufacturing industries is given below:

Manufactures of—

- (1) **Vegetable Products**, including—Coffee and Spices; Cocoa and Chocolate; Preserved and Canned Products; Pickles, Vinegar and Cider; Flour and Cereals; Bread and other Bakery Products; Macaroni and Vermicelli; Distilled and Brewed Liquors and Wines; Rubber Products; Starch and Glucose; Sugar; Tobacco Products; Linseed Oil and Oil Cake.
- (2) **Animal Products**, including—Fish and Fish Products; Dairy Factory Products; Meat and Meat Products; Leather and Leather Products; Furs and Fur Products.
- (3) **Textiles and Textile Products**, including—Cotton Textiles (Cloth, Yarn, Thread and Waste); Woollen Textiles (Cloth, Yarn, Blankets, Felt and Waste); Silk Products; Factory-Made Clothing; Carpets, Rugs and Mats; Cordage, Rope and Twine.
- (4) **Wood and Paper**, including—Pulp and Paper Mill Products; Paper Goods; Printing, Publishing and Lithographing; Saw and Planing Mill Products; Furniture; Carriages; Wagons and Sleighs; Wooden Containers; Woodenware; Turned Wood Products; and the Output of Similar Wood-Using Industries.
- (5) **Iron and Steel and Their Products**, including—Pig Iron and Ferro-Alloys; Steel and Rolled Products; Castings and Forgings; Boilers, Tanks and Engines; Agricultural Implements; Machinery; Automobiles; Auto Parts and Accessories; Bicycles; Railway Rolling Stock; Wire and Wire Goods; Sheet Metal Products; Hardware and Tools; Bridge Building and Structural Steel Work; Miscellaneous Iron and Steel Products.
- (6) **Manufactures of Non-Ferrous Metal Products**, including—Aluminium Products; Brass and Copper Products; Lead, Tin and Zinc Products; Jewellery and Silverware; Electrical Apparatus and Supplies; Non-Ferrous Smelting and Refining; Miscellaneous Non-Ferrous Metal Products.
- (7) **Manufactures of the Non-Metallic Minerals**, including—Aerated Waters—Asbestos Products—Cement—Cement Products—Coke and Gas—Glass (blown, cut, ornamental, etc.)—Lime—Petroleum Products—Products from Domestic Clays—Products from Imported Clays—Salt—Sand—Lime Brick—Dressed Stone—Artificial Abrasives and Abrasive Products—Miscellaneous Non-Metallic Mineral Products including (a) Artificial Graphite and Electrodes (b) Gypsum Products (c) Mica Products (d) Magnesite Products (e) Miscellaneous Non-Metallic Mineral Products, n.e.s.
- (8) **Chemicals and Allied Products**, including—Coal Tar Distillation; Acids, Alkalies, and Salts—Compressed Gases; Explosives, Ammunition and Fireworks; Fertilizers; Medicinal and Pharmaceutical Preparations; Paints, Pigments and Varnishes; Soaps and Washing Compounds—Toilet Preparations; Inks; Adhesives; Polishes and Dressings; Wood Distillation; Miscellaneous Chemical Products including (a) Baking Powder, (b) Boiler Compounds, (c) Celluloid Products, (d) Insecticides, (e) Sweeping Compounds, (f) Disinfectants, (g) Matches, (h) Dyes and Colours, (i) Chemical Products, n.e.s.
- (9) **Miscellaneous Products**, including—Brooms and Brushes; Electric Light and Power; Musical Instruments, etc.

The statistics of manufactures are also classified according to the **use or purpose** of the end product as follows:—

- (1) **Food**, including—Breadstuffs; Fish; Nuts; Fruits and Vegetables; Meats; Milk Products; Oils and Fats; Sugar; Infusions; Miscellaneous.
- (2) **Drink and Tobacco**, including—Beverages, alcoholic; Beverages, non-alcoholic; Tobacco.
- (3) **Clothing**, including—Boots and Shoes; Fur Goods; Garments and Personal Furnishings; Gloves and Mitts; Hats and Caps; Knitted Goods; Waterproofs; Miscellaneous.
- (4) **Personal Utilities**, including—Jewellery and Time-Pieces; Recreational Supplies; Personal Utilities, n.e.s.
- (5) **House Furnishings**.
- (6) **Books and Stationery**.
- (7) **Vehicles and Vessels**.
- (8) **Producers' Materials**, including—Farm Materials; Manufacturers' Materials; Building Materials; General Materials.
- (9) **Industrial Equipment**, including—Farming Equipment; Manufacturing Equipment; Trading Equipment; Service Equipment; Light, Heat and Power Equipment; General Equipment.
- (10) **Miscellaneous**.

PREFACE

Statistical reports on Canada's mineral production have been published annually since 1886. The reports were first issued by the Geological Survey of Canada, later by the Mines Branch of the Department of Mines and since 1921 by the Dominion Bureau of Statistics. A preliminary report giving the quantity and value of the metals, non-metals, and structural materials produced in each province of the Dominion is issued on March 15 following the year to which it refers. The annual report contains final production data on each mineral produced in Canada, tables of world production, by countries, of all important economic minerals, and statistics on capital invested in the Canadian mining industry, salaries and wages paid, number of employees and fuel and power consumed.

A new feature of this report is a chronological record of principal Canadian mining events from 1604 to 1932. This record, which is shown on pages 5 to 10 is not guaranteed to be complete since it is the first attempt to make such an historical summary and suggestions as to its improvement or corrections are invited.

Low prices and generally depressed economic conditions are reflected in the value of the mineral production in 1931, but the increase in the output of gold was a steadying influence and helped materially to bolster up this important Canadian industry. The mineral resources of the country are both widespread and diversified. Large base metal mines have been developed and contingent concentrating smelting and refining facilities have been constructed so that the Canadian mining industry is now well equipped to supply substantial quantities of the principal metals for many years to come.

As in former years, the Bureau has continued to co-operate with the provinces of Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia in the collection of coal statistics.

Further progress has been made in the co-ordination of provincial and Dominion statistics relating to mineral production. Arrangements similar to those which have been working satisfactorily for a number of years with the provinces, of Quebec, Ontario and British Columbia were made during the year with the Department of Mines and Natural Resources of Manitoba. The provinces and the Bureau use joint forms in the collection of mineral statistics and the advantage gained is appreciable. By these arrangements the operators are now required to file only one form, in duplicate, which tends to greater comparability in Dominion and provincial figures.

The cordial thanks of the Bureau are tendered to mine and smelter operators, to the Department of the Interior, to the federal Department of Mines, and to the Royal Canadian Mint for assistance given and information made available. The railway and other transportation companies, as well as smelter operators outside of Canada, have also furnished data, the receipt of which is gratefully acknowledged.

This report has been prepared under the direction of Mr. W. H. Losee, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch, by Mr. R. J. McDowall, B.Sc., and Mr. B. R. Hayden of the mineral division staff.

R. H. COATS,

Dominion Statistician.

DOMINION BUREAU OF STATISTICS,

OTTAWA, May 5, 1933.

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DOMINION BUREAU OF STATISTICS

R. H. COATS, B.A., F.S.S., (Hon.) F.R.S.C., Dominion Statistician

W. H. LOSEE, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch

CHRONOLOGICAL RECORD OF EVENTS IN THE HISTORY OF CANADIAN MINING, 1604-1932

From time to time it becomes necessary to refer to certain events in Canadian mining history. Such events have been recorded in various government publications and in other mining literature. Difficulty, however, is often experienced in locating these data easily. In order that such information may be readily accessible, an attempt has been made this year to compile a list of the more outstanding events in Canadian mining history and the assistance given the Bureau by the Mines Departments of the various provinces is hereby acknowledged. The record is not guaranteed to be entirely correct or exhaustive in every particular and suggestions as to improvement or corrections are invited. It is hoped that the Canadian mining fraternity may find this compilation of some assistance and interest.

Year

- 1604—Discovery of iron and silver reported at St. Mary's Bay, Nova Scotia, by Master Simon, a mining engineer accompanying Champlain. Native copper was also reported to have been found at Cape d'Or.
- 1654—Louis XIV granted a concession to Nicholas Denys to mine gold, silver, copper and other minerals on Cape Breton Island.
- 1672—Nicholas Denys reports the discovery of coal on Cape Breton Island.
- 1677—Intendant of New France, M. Duchesneau, proclaimed the imposition of a royalty of 20 sous per ton on coal mined in Cape Breton.
- 1711—Admiral Walker obtains coal in Cape Breton.
- 1720—First coal produced in Canada by regular mining methods on north side of Cow Bay, Cape Breton, N.S.
- 1724—Coal was exported from Cape Breton to Boston.
- 1737—Iron ores smelted on St. Maurice river, Quebec, by Cugnet & Cie or "La Compagnie des Forges."
- 1744—Publication of Bellin's map showing existence of silver-lead ores on Lake Temiskaming, Quebec, now known as the Wright mine.
- 1770—Jesuit Fathers experimented with native copper found at Point Mamainse, north shore Lake Superior.
- 1771—Samuel Hearne, Hudson's Bay clerk, prospects the Copper Mine River area, Northwest Territories, for copper.
- 1779—Earliest recorded gypsum mining operations by settlers, Nova Scotia.
- 1782—Coal mined in vicinity of Grand Lake, New Brunswick.
- 1784—Government commenced systematic coal mining on northwest shore of Sydney Harbour, N.S.
- 1789—Sir Alex. MacKenzie discovers coal on Great Bear River, Northwest Territories.
- 1800—First iron furnace in Ontario erected in Leeds county at Furnace Falls (Lyndhurst) by D. Sherwood, S. Barlow, W. Sutherland and E. Jones.
- David Thompson discovers coal on Saskatchewan river.
- 1813—Blast furnace erected by John Mason at Normandale, Norfolk county, Ontario, used unsuccessfully in treating bog ores.
- 1822—First record of gypsum mining in Ontario, near Paris.
- Normandale iron furnace commenced successful iron smelting operations in Ontario under Mr. Van Norman.
- 1823—Placer gold discovered on Chaudière River, Quebec, by a woman.
- First gypsum mill operated in Ontario.
- 1826—General mining association formed in Nova Scotia.
- 1829—Lièvre river apatite deposits in Quebec discovered.
- 1830—First mining shaft in Nova Scotia sunk on Sydney main coal seam.
- 1835—Coal discovered at Suquash, Vancouver Island, through information supplied by Indians.
- 1840—First hydraulic cement made in Canada at Hull, Quebec.
- 1843—Geological Survey of Canada instituted under Sir Wm. Edmund Logan.
- 1846—Silver veins reported in vicinity of Thunder Bay, Lake Superior.
- 1847—Normandale iron furnace in Ontario shut down owing to lack of ore and fuel.
- First mention of copper ores in Eastern Townships, Quebec, in Geological report, 1847-48.
- Gypsum mining operations commenced near Hillsborough, New Brunswick.

- 1850—Indians locate Douglas coal seam at Nanaimo, B.C.
- 1852—August 24, J. W. McKay, Hudsons Bay Co. factor sent by James Douglas from Victoria to take possession of Nanaimo coal field and collect royalty from users of coal.
Free gold discovered in quartz at Mitchell harbour, Queen Charlotte Islands, causing the first auriferous quartz rush in British Columbia.
- 1853—March 26. Governor Douglas, Victoria, issues, as Lieutenant Governor of Queen Charlotte Islands Crown Colony, the first proclamation relating to mining in British Columbia.
- 1855—Placer gold found at the mouth of Pend d'Oreille River, B.C., by ex-servants of the Hudsons Bay Company at Fort Colville.
- 1857—Sir James Hunter locates coal on Souris river, Manitoba.
Placer gold reported at the junction of the Fraser and Thompson rivers, B.C.
December 28. James Douglas issues proclamation regarding working of gold mines located chiefly in the Kamloops, Ashcroft, and Vernon areas of British Columbia.
- 1858—Introduction of Canadian decimal currency.
Legislature of Nova Scotia obtained possession and control of mines and minerals of province.
First producing oil well on American continent opened in Lambton county, Ontario.
Discovery of placer gold in the lower reaches of the Fraser river, B.C., caused rush to Yale, Hope and the Canyon by miners from California and other foreign parts.
- 1859—Passage of the Goldfields Act, British Columbia, Sept. 7.
Placer miners penetrate to Cariboo and Quesnel, B.C.
Canadian silver coinage issued.
- 1860—John Pulsiver discovered gold in Tangier district, Halifax county, N.S.
Pete Toy bar discovered at the Parsnip and Findlay rivers, B.C.
- 1861—Gold discovered in Oldham district, Halifax county, N.S.
- 1862—Gold discovered in Lawrencetown, Isaacs Harbour and Renfrew districts, N.S.
- 1863—Miners from State of Washington ascending the Kootenay, establish Wildhorse Creek diggings, B.C.
Issue of a comprehensive Geology of Canada under Sir William Logan.
- 1864—Placer gold located on Leech Creek, B.C.
Copper claims staked on Howe Sound and Knight Inlet.
- 1865—Dewdney trail completed to Wildhorse from Hope, B.C., to enable gold escorts to reach Victoria on British territory.
Placer claims staked on Big Bend area of Columbia river, B.C., by former Cariboo miners.
Gold discovered in Mount Uniacke district, Nova Scotia.
Eustis mine opened in Eastern Townships, Quebec.
- 1866—First discovery of gold in Canadian Pre Cambrian shield near Madoc, Hastings county, Ontario, known as Richardson mine, made by a Dutch prospector named Powell and associates. Thos. McFarlane discovers high grade silver ores in Ontario on an island in Lake Superior. (Silver Islet mine).
First recorded production of salt in Ontario, near Maitland river.
- 1869—Gold discovered in Fifteen Mile stream district, Nova Scotia.
Gold discovered in Yukon river.
- 1870—First commercial shipments of apatite in Canada made from North Burgess Tp., Ont.
- 1871—First recorded production of soapstone in Quebec from Bolton tp., Brome county.
Dominion Lands Survey Branch created.
- 1872—Huronian mine (Moss) N.W. Ontario, located by Peter McKellar on advice of an Indian.
First staking of silver ores on Eureka Mt., near Hope, B.C.
- 1873—Dease Lake areas, B.C., staked for placer gold, first staker W. H. Smith.
Omineca placer mining area began to open up and Manson creek settlement established.
- 1877—Geological Survey of Canada recognized by Act of Parliament.
- 1878—Asbestos first mined in Quebec by Andrew Johnston (Johnston Asbestos Co.)
- 1879—Coal fields of the Crows Nest Pass, B.C., opened.
- 1880—Geological Survey offices and museum moved from Montreal to Ottawa.
- 1881—Quebec Technical Mines Branch formed as division of Crown Lands Department.
- 1882—Copper-nickel ores discovered near Sudbury (Murray mine) by Thos. Flanagan.
- 1883—Thos. Frood and A. J. Cockburn discover Frood mine, Sudbury area, Ontario.
Miners penetrated into the West Kootenay district, British Columbia, locating mines on Kootenay river and Kootenay lake.
- 1884—Worthington mine, Sudbury area, Ont., discovered by F. C. Crean.
Silver Islet mine, Lake Superior, abandoned.
Kingdon lead mine deposits, Carleton Co., Ontario, worked.
- 1885—Samuel J. Ritchie organized Canadian Copper Company.
Copper Cliff mine, Ont., discovered.
Henry Ranger locates Creighton mine, Sudbury area, ore deposit first noted by Surveyor Salter and Geologist Murray.
Canadian Pacific Railway completed.
John Chance staked Granite Creek placer deposits in British Columbia.
Cayoosh Creek placers staked in British Columbia.

- 1886—First shipments of coal from Lethbridge area, Alberta.
First complete statistical returns issued by Geological Survey of Canada.
Incorporation of Canadian Copper Company.
First stakings in Boundary Creek area, British Columbia, by W. T. Smith.
First officially recorded Canadian mica production in Ontario and Quebec.
- 1888—Asbestos first milled in Quebec by Scottish Canadian Asbestos Co.
Coal discovered near Banff, Alberta.
Coal mining commenced at Canmore, Alberta.
First smelter blown in at Copper Cliff, Ont., December 24th.
Monarch mine on Canadian Pacific Railway at Field, B.C., opened.
Discovery of natural gas in Essex county, Ontario.
- 1889—Levack mine, Sudbury area, Ont., discovered by James Stobie.
First organized mining operations in Sudbury area conducted by H. H. Vivian and Co. of Swansea, Wales.
Discovery of Leamington gas field in Ontario.
James Riley, Glasgow engineer, discovers the hardening and toughening effect of nickel in steel making.
Rossland Camp at head of Trail Creek, B.C., opened by staking of Lily May by Joe Bourjouis.
- 1890—Coal first mined in Turtle Mountain field, Manitoba. Vaden mine.
First smelter blown in at Murray mine, Sudbury. Matte shipped to Wales.
- 1891—First shipments from Rossland, B.C., go to Colorado Smelting Works, Butte, Montana.
Sultana mine, Lake of Wood district, Ontario, opened, closed 1906.
United States navy concludes successful experiments using nickel-steel for the first time as armour plate.
Bureau of Mines, Ontario, organized.
Garson Mine, Sudbury, discovered by John T. Cryderman.
- 1892—Col. R. M. Thompson develops the Orford nickel-copper separation process.
Dr. Ludwig Mond develops the Mond copper-nickel separation process.
Sullivan camp, B.C., commenced by staking of the Hamlet, etc., claims by Pat Sullivan, John Cleaver, E. C. Smith and W. C. Burchett.
- 1893—Kneehills coal mines, Alberta, opened.
Mikado mine, Lake of Wood district, Ontario, discovered.
- 1894—Pilot Bay smelter constructed and silver-lead-zinc mines of Ainsworth and Slocan, B.C., become active.
- 1895—Sullivan mine, B.C., commenced shipping.
- 1896—Salt produced in Dauphin Lake district, Manitoba; sold to settlers.
Iron ore bounties inaugurated.
Black Donald graphite mine, Renfrew county, Ontario, discovered and operated in 1897.
Discovery of placer gold in Klondike, Yukon Territory.
Hall mines smelter at Nelson, B.C., opened.
Iron Mask staked August 13 at Kamloops, B.C., by Geo. Breedson.
B.C. Smelting and Refining Company started smelting Rossland ores at Trail in February—Promoters: D. C. Corbin and August Heinze.
- 1897—Pioneer mine, B.C., located September 6, by Wm. Allen.
- 1898—Atlin goldfields, B.C., discovered by prospectors turning aside from the Klondike gold rush; Rainy Hollow copper deposits discovered in same manner.
- 1898—Pioneer and other claims staked on Cadwallader Creek, B.C.
Britannia mine deposits, B.C., discovered by Oliver Furry.
- 1899—Helen iron mine, Ontario, opened by Algoma Steel Corporation
Frood mine, Sudbury, opened.
Vananda smelter, B.C., started.
Sunset claim, Copper Mountain, B.C., staked.
Granby Consolidated Mining, Smelting and Power Co., B.C., incorporated.
- 1900—Mond Nickel Company incorporated.
Corundum mining commenced in Renfrew county, Ontario.
Klondike gold production reaches maximum.
Nova Scotia Steel and Coal Co. acquire Sydney coal mines of General Mining Association.
April 1st, Grand Forks smelter started in B.C.
Bonanza mine, Observatory Inlet, B.C., discovered by Donahue and H. C. Flewin.
Talc mining started in Hastings county, Ontario.
- 1901—First wells drilled for natural gas in Medicine Hat field, Alberta.
Creighton mine, Sudbury area, commenced production.
Crofton smelter, B.C., started.
Britannia mine, B.C., starts shipping concentrates to Tacoma.
Hidden Creek mine, Observatory Inlet, B.C., discovered by McMillan, Rudge and H. C. Flewin.
Boundary Falls smelter, B.C., started.
Tye smelter, B.C., started.
First active development of gypsum deposits in Manitoba, the Manitoba Union Mining Company erecting a crushing and calcining mill on Portage Bay.

- 1902—Incorporation of International Nickel Co. of New Jersey.
Marysville smelter, B.C., constructed.
Electrolytic lead (Betts process) made at Trail, B.C.
- 1903—High grade silver-cobalt minerals discovered at Long Lake, Temiskaming district, Ontario.
Later known as the Cobalt Camp.
St. Anthony mine, Sturgeon Lake, commenced producing.
Settlement of Alaska Boundary dispute.
Production of aluminium at Shawinigan Falls, P.Q.
Mining commenced at Hedley, B.C.
First recorded natural gas production in Alberta.
- 1904—Nipissing Mines incorporated.
La Rose Mine, Cobalt, starts producing.
W. G. Trethewey located Trethewey mine, Cobalt, Ont.
Coniagas mine located, Cobalt, Ont.
Copper gold ores discovered in Chibougamou district, Quebec.
- 1905—Atikokan iron mine, Ontario, equipped for production.
Buffalo mine, Cobalt, Ont., started operating.
First recorded shipment of Canadian fluorspar, Madoc, Ont.
- 1906—January 18th. Consolidated Mining and Smelting Co. of Canada, incorporated.
Ontario Mining Act passed.
Discovery of gold by Ollier and Renault on Lake Fortune (Lake Fortune Mine), P.Q.
Silver discovered at Elk Lake, Ontario.
Gold discovered at Larder Lake, Ontario.
First electrical mining equipment used in Canada installed at Creighton mine, Sudbury district, Ontario.
- 1907—Silver discoveries at Gowganda, Ont.
Silver discovered in South Lorraine, Ontario.
Supplementary Revenue Act imposes tax on mining profits in Ontario.
Federal Department of Mines created under a Minister of Mines.
Silver and arsenic produced at Deloro, Ontario, from silver-cobalt-nickel-arsenic ores of the Cobalt District of Ontario.
- 1908—First gold discovery in Porcupine area, Ontario, by H. F. Hunter.
First silver production from South Lorraine, Ontario.
Branch of Royal Mint established at Ottawa, Ont.
First shipments of magnesite from deposits in Grenville township, P.Q.
- 1909—Hollinger mine gold veins discovered by Benjamin Hollinger, John Miller and Alex. Gillies.
McIntyre mine veins, Porcupine, Ont., discovered by Alex. McIntyre.
Dome mine deposits, Porcupine, Ont., discovered by John Wilson and associates.
- 1910—Premier mine, B.C., discovered by Bunting Bros. and Wm. Dislworth.
Mixed nickel and cobalt oxides produced at Deloro, Ontario.
- 1911—First gold discovery in vicinity of Kirkland Lake, Ont., made by W. H. Wright on what is now known as the Wright-Hargreaves mine.
Porcupine camp destroyed by fire with heavy loss of life.
Discovery of gold by J. J. Sullivan and H. Authier in Dubuisson tp., P.Q.
First recorded discovery of gold in Manitoba by Major E. A. Pelletier at Rice Lake.
First shipment of British Columbia gypsum used in cement manufacture.
Victoria Memorial Museum, Ottawa, completed.
Black Cobalt Oxide and Grey Cobalt Oxide first marketed from Deloro, Ontario.
- 1912—Hollinger mine, Porcupine, commenced first milling operations.
Low grade cyanide process developed at Nipissing mine, Cobalt.
Copper Mountain claims, B.C., taken over by British Columbia Copper Co.
Wet cement process introduced in St. Mary's mill, Ontario.
Natural gas production commenced in Stony Creek field, New Brunswick.
Harry Oakes staked ground later known as Lake Shore Mine at Kirkland Lake, Ont.
- 1913—Tough-Oakes mine, Kirkland Lake camp, Ont., shipped high grade cobbed ore.
Gold discovered on Kirkland Lake properties known later as Lake Shore, Teck-Hughes, Kirkland Lake and Sylvanite mines.
Smelting of nickel ores commenced by Mond Nickel Co. at Garson, Ont., May 15.
Incorporation of British American Nickel Co., Ltd.
- 1914—Supplementary Revenue Act in Ontario changed to The Mining Tax Act.
- 1915—Siscoe mine claims staked in Quebec by S. E. Siscoe.
Flin Flon ore deposits discovered by Thos. Creighton representing the Hammell-Currie-Fasken syndicate.
- 1916—Construction commenced on nickel refinery at Port Colborne, Ont.
Incorporation of International Nickel Co. of Canada.
Falconbridge Nickel deposits, Sudbury district, Ontario, later known as Falconbridge Nickel Mines discovered by drilling.
Pioneer mine, B.C., commences drilling operations.
Electrolytic refined copper and zinc first produced at Trail, B.C.
- 1917—Teck Hughes mine, Kirkland Lake, starts milling.

- 1918—Tough-Oakes mine temporarily closed.
Refined nickel produced in Canada at Port Colborne plant of International Nickel Co. Premier mine, B.C., comes into production.
- 1919—Lake Shore, Wright-Hargreaves, and Kirkland Lake mills commenced operations. Ontario Department of Mines formed.
Smelter of British American Nickel Co. at Nickelton, Ontario, and refinery at Deschenes, Quebec, commenced operations.
L. Beauvet discovers silver-lead ores at Keno Hill, Mayo district, Yukon.
First salt shipments from Malagash deposits in Nova Scotia.
- 1920—Rock salt discovered at Fort McMurray, Alberta.
- 1921—Noranda ore deposits, Quebec, staked by Ed. Horne.
First shipment of silver-lead ores from Mayo, Yukon.
- 1922—Amulet mine claims, Quebec, staked by McDonough Bros.
Rod mills appear as milling equipment in Canadian mining plants.
- 1923—Granada mine claims, Rouyn, Quebec, staked by R. C. Gamble et al.
Sherritt-Gordon ore deposit staked by Carl Sherritt and Phillip Sherlett in January.
Red Coulee well first to reach oil in Sunburst formation, southern Alberta.
- 1924—British American Nickel Co. went into liquidation.
Royalite No. 4 well, Turner Valley, Alberta, brought into production.
- 1925—Discovery of gold in Red Lake district by Lorne Howey on what was later known as the Howey mine.
Waite-Ackerman-Montgomery mine claims staked by H. Montgomery.
Allenby Copper Company takes over Copper Mountain claims in August and ships concentrates to Trail, B.C.
- 1926—Aluminium first produced at Arvida, P.Q., by Aluminum Company of Canada.
Falconbridge Nickel Mines incorporated.
- 1927—Noranda mine commenced shipping, smelter operated for first time.
Waite-Ackerman-Montgomery mine started shipping.
Central Manitoba mine operated mill for first time.
Sherritt-Gordon mines incorporated in Ontario, July 5.
- 1928—Collapse of Worthington mine.
Merger of Mond and International Nickel Companies.
Coniaurum mill, Porcupine camp, Ont., commenced production in July.
March mine, Porcupine camp, Ont., came into production.
Disastrous underground fire in February at Hollinger mine, Porcupine camp, Ont., 39 lives lost.
Argonaut and Associated Goldfields suspended gold mining operations in Ontario.
Tough-Oakes-Burnside mine closed November 28.
- 1929—Canada's mineral production reached a record value of \$310,850,246.
Red Coulee field, Alberta, began petroleum production.
Siscoe gold mine, Quebec, starts production.
New 300 ton mill of Monarch mine, B.C., started producing.
Dome mine mill, Porcupine camp, Ont., destroyed in October by fire.
New surface plant at Frood mine, Sudbury, Ont., placed in operation.
- 1930—Gold discovered in Bannockburn township, Ontario, on what was later known as the Ashley mine.
Mill installed on Minto mine, Michipicoten, Ont.
New mill at Howey mine, Red Lake, Ont., commenced operations April 2.
Silver-radium ores discovered by G. Labine at Great Bear Lake, N.W.T.
Granada mine, Quebec, commenced production.
Manitoba, Saskatchewan and Alberta took over natural resources from federal government.
Island Falls power plant, Manitoba, operated for first time, June 1.
First refined zinc produced in November at Flin Flon, Manitoba, by Hudson Bay Mining and Smelting Co.
First blister copper produced at Flin Flon, Manitoba, in December.
New smelter of International Nickel Co. blown in at Copper Cliff, July 1.
New electrolytic copper refinery of Ontario Refining Co. placed in operation at Copper Cliff, Ont.
New Falconbridge Nickel Mines smelter blown in Feb. 4, Sudbury, Ont.
Bismuth first produced at Trail, B.C.
Fuming plant constructed at Trail, B.C., for recovery of lead and zinc.
Copper Mountain mine, B.C., closed down November 15.
Canada attained position of the world's second greatest gold producer.
Nitric acid and sulphuric acid produced regularly in new plant of Canadian Industries Limited at Copper Cliff, Ont.
- 1931—Toburn (Tough-Oakes) mine, Kirkland Lake, re-opened.
Lake Shore mine, Kirkland Lake, Ont., installs 200 ton flotation unit in mill.
Gold discoveries made in Swayze and Three Duck Lake areas, Ontario.
Parkhill and Minto mines in Michipicoten district, Ontario, came into production.

- 1931—Commercial production of fertilizer commenced at Trail, and smoke claims against Consolidated Mining and Smelting Company settled.
 Nipissing Mining Company, Cobalt, Ont., ceased mining silver-cobalt ores.
 Selenium produced for the first time in Canada by Ontario Refining Co. Ltd.
 Mining Corporation discontinued mining in South Lorraine, Ont.
 Keeley Silver mine, South Lorraine, Ont., closed.
 Canadian Copper Refiners Ltd., operated new copper refinery at Montreal East, P.Q.
 Regular production commenced by Sherritt-Gordon mill, Manitoba, April 1st.
 Equalization exchange premiums paid by Dominion Government to gold miners.
 Exports of gold bullion without licence prohibited by Dominion government.
 Great Britain goes off the gold standard on September 21, and is followed by many other countries.
 Prices of copper, lead, zinc and silver reached record low levels.
 Big Missouri Mine, B.C., operated pilot mill.
 Nickel Plate mine, Hedley, B.C., closed down.
 Orford process plant completed at Copper Cliff, Ont.
 Copper converters at Port Colborne, Ont., closed down in August preparatory to transferring Orford process to Copper Cliff.
 New Brunswick Power Commission plant came into operation in September using Minto coal.
 Test shipments of Ontario lignite, from Onakawana deposits, made to Germany.
- 1932—Ashley Mine, Ontario, commenced gold production in October.
 Nickel output in Ontario greatly reduced.
 Kenty mine in Swayze area, Ontario, sank two shafts.
 O'Brien Cadillac mine, Quebec, commenced gold milling.
 Sherritt-Gordon, Manitoba, suspended mining operations in June.
 San Antonio gold mine, Manitoba, commenced production in May.
 Beattie Gold mines, Quebec, commenced construction of mill.
 Treadwell Yukon Mining Co. commenced production of gold in new mill on Bussière claims in Quebec.
 United States imposed duty of 4 cents per pound, in June, on foreign copper.
 Imperial Economic Conference meeting in Ottawa recommended duty on foreign copper entering Great Britain.
 McLeod River Mining Corporation operated gold dredge near Peers, Alberta.
 Salt produced commercially for first time at Neepawa, Manitoba.
 First commercial shipment of silver-radium ores from Great Bear Lake, N.W.T., silver ores being smelted at Trail, B.C.
 Silver reached a record low of 24.5 cents in New York, December 29.
 Eldorado Gold Mines commenced treatment of radium-bearing ores in new plant at Port Hope, Ont.
 Record low prices established for copper, lead, silver and zinc.
 Domestic Fuel Act expired June 20.
 Moss Mine, Thunder Bay district, Ontario, commenced gold production.

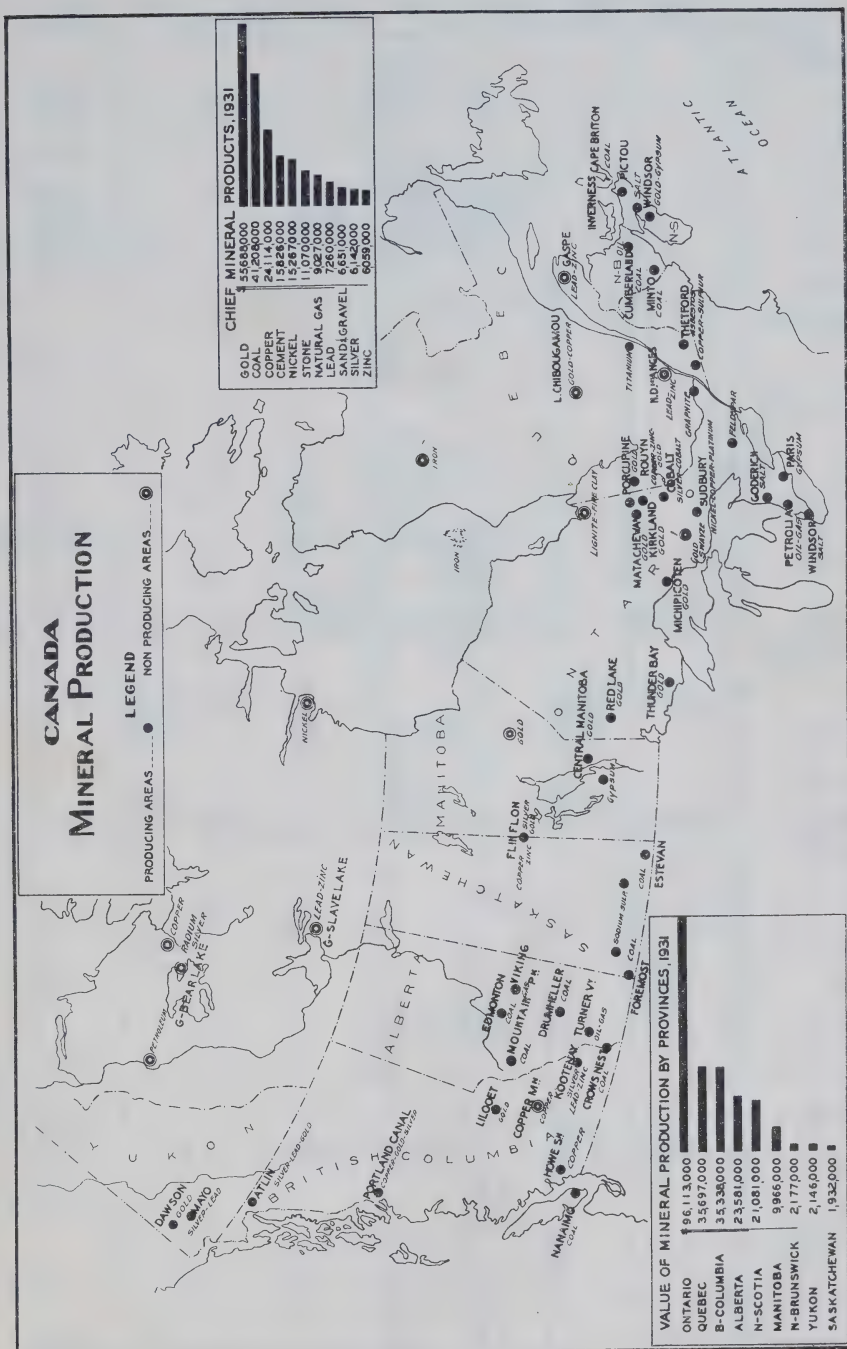


Table 1.—Mineral Production of Canada, by Provinces, 1931

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon
METALLICS									
Arsenic (As ₂ O ₃)..... lb.				3,575,936					
				135,170					
Bismuth..... lb.				7,331				110,876	
				3,532				154,118	
Cadmium..... lb.								180,958	
				521,051					
Cobalt..... lb.				651,179					
Copper..... lb.			68,376,985	112,882,625	45,821,432			65,223,348	
			5,723,154	9,096,463	3,835,254			5,459,194	
Gold..... fine oz.	460		300,075	2,085,814	102,969			160,069	44,310
	9,509		6,203,101	43,117,600	2,128,558		4,031	3,308,920	915,969
Lead..... lb.				985,633				261,902,236	4,454,613
				41,647				7,097,812	120,724
Manganese ore..... tons	60	57							
	2,400	493							
Molybdenite (concentrates)..... lb.				1,222					
				280					
Nickel..... lb.				65,666,320					
				15,267,453					
Palladium, Rhodium, Iridium, etc. fine oz.				46,918					
				1,217,717					
Platinum..... fine oz.				44,725				50	
				1,595,117				1,783	
Selenium..... lb.				16,899	3,870			731	
				32,108	7,353			1,389	
Silver..... fine oz.	48	530,345	7,438,951	836,547	249,877		29	8,061,599	3,694,728
	14	158,414	2,222,014				9	2,408,000	1,103,615
Titanium ore..... tons		1,509							
		10,261							
Zinc..... lb.					35,173,749			202,071,702	
					898,338			5,160,911	
Total..... \$	11,923	493	12,094,930	73,380,280	7,119,380		4,040	23,773,085	2,140,308
NON-METALLICS									
Fuels									
Coal..... tons	4,955,563	182,181			1,306	662,836	4,564,015	1,876,406	904
	19,016,720	743,196			3,797	945,259	13,342,675	7,150,996	5,039
Natural gas... M cu. ft.		655,891		7,419,534	600		17,798,698		
		323,184		4,635,497	180		4,067,893		
Peat..... tons			1,170	504					
			5,937	1,006					
Petroleum, crude... bbl.		8,577		122,365			1,413,631		
		15,461		219,993			3,976,220		
Total..... \$	19,016,720	1,081,841	5,937	4,856,586	3,977	945,259	21,386,788	7,159,996	5,039
OTHER NON-METALLICS									
Actinolite..... tons				35					
				456					
Asbestos..... tons			164,296						
			4,812,886						
Barytes..... tons	16								
	363								
Bituminous sands..... tons							1,015		
							4,060		
Diatomite..... tons	1,484			60				66	
	29,679			840				2,270	
Feldspar..... tons			10,381	7,962					
			86,842	100,119					
Fluorspar..... tons				40					
				620					
Graphite..... tons				548					
				32,149					
*Grindstones..... tons		299						322	
		12,308						25,795	
Gypsum..... tons	707,817	58,957		53,358	23,076			20,544	
	878,487	451,264		374,469	231,124			176,173	
Iron oxides..... tons			5,410					110	
			48,205					1,000	
Magnesite††..... tons			11,411						
			295,579						
Manganese (bog)..... tons		77							
		462							
Mica..... tons			290	1,049					
			30,601	23,465					
Mineral water. Imp. gal.			19,868	107,540					
			4,746	8,578					
†Sulphur..... tons			14,586	6,508				29,013	
			108,617	65,080				255,760	
Quartz..... tons	3,116		26,987	97,888	67,214			519	
	6,836		69,759	148,642	76,624			1,297	
Salt..... tons	27,718			231,329					
	143,761			1,760,388					

*Includes grindstones, pulpstones and scythstones.

†See note at foot of table 2.

††Magnesite-dolomite.

Table 1.—Mineral Production of Canada, by Provinces, 1931—Concluded

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon
Other Non-Metallies—con.									
Silica brick..... M	621			279					
\$	22,044			13,702					
Soapstone..... tons									
\$			34,439						
Sodium carbonate... tons								712	
\$								7,351	
Sodium sulphate... tons									
\$						421,097			
Talc..... tons				11,806				30	
\$				122,044				600	
Volcanic dust..... tons						128			
\$						2,560			
Total..... \$	1,681,170	464,034	5,491,671	2,650,552	307,748	423,657	4,060	470,246	
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS									
Clay Products									
Brick—									
Soft mud process—									
Face..... M	120	100		4,954			302		
\$	1,560	2,200		105,006			7,550		
Common..... M	780	3,134		24,478	5,209	415	1,734	5,427	
\$	10,660	42,671		373,130	76,688	5,451	22,280	88,477	
Stiff mud process—									
Face..... M	349	910	32,113	40,935	794	576	675	783	
(wire cut) \$	9,970	25,669	766,988	873,334	17,577	20,233	12,328	26,848	
Common..... M	3,728	1,778	56,464	17,008	30	1,831	379	712	
\$	54,573	26,311	841,868	249,880	360	18,095	3,267	11,110	
Dry press—									
Face..... M			2,894	13,991		27	2,779	458	
\$			74,970	300,614		720	28,937	18,116	
Common..... M			250	2,719			3,797	1,922	
\$			2,500	39,767			36,179	28,767	
Fancy or ornamental brick..... M			76	259					
\$			3,944	16,829					
Sewer brick..... M				1,946					307
\$				33,321					10,371
Paving brick..... M									19
\$									682
Firebrick..... M	7					415	24	1,802	
\$	240					24,568	1,193	81,596	
Fireclay..... tons	65	48				484		636	
\$	650	1,930				3,915		8,362	
Bentonite..... tons								187	
\$								935	
Fireclay blocks and shapes..... \$	825	535				63,603		18,076	
Hollow blocks..... tons	7,372	1,776	41,585	41,774	1,278	3,177	5,360	3,313	
\$	86,632	16,706	477,720	346,079	15,703	28,299	42,276	33,219	
Roofing tile..... No.				6,935					
\$				720					
Floor tiles (quarries) sq. ft.				107,418		81			
\$				31,395		20			
Drain tile..... M	159	3	696	10,210	248		55	1,147	
\$	6,611	127	24,864	244,368	12,300		1,721	38,419	
Sewer pipe, copings, flue linings, etc.... \$	295,465		168,054	696,964			227,305	121,075	
Pottery, glazed or unglazed..... \$		27,199		73,860		1,031	146,502	8,533	
Other clay products.. \$				167,533		322	178	3,919	
Total..... \$	467,126	143,348	2,369,908	3,552,800	122,628	166,257	529,716	498,505	
OTHER STRUCTURAL MATERIALS									
Cement..... brls.			4,942,323	3,470,056	544,160		626,483	578,636	
\$			7,092,895	5,006,826	1,267,893		1,286,080	1,172,549	
Lime..... tons	18,430	11,241	111,496	147,660	21,014		5,118	29,826	
\$	79,418	127,054	804,218	1,222,270	207,401		46,785	277,269	
Sand and gravel..... tons	403,858	183,475	7,657,964	7,465,017	871,986	1,388,594	1,050,988	2,720,704	
\$	198,757	18,149	1,952,959	2,562,477	294,178	396,707	313,616	914,322	
Slate..... tons								250	
\$								5,000	
Stone..... tons	83,181	62,325	4,265,529	3,359,364	153,248		2,496	471,717	
\$	225,632	341,991	5,893,042	2,881,444	642,649		9,642	1,075,784	
Total..... \$	503,807	487,194	15,743,114	11,673,017	2,412,121	396,707	1,656,123	3,444,924	
Grand Total..... \$	21,080,746	2,176,910	35,696,563	96,113,235	9,965,854	1,931,880	23,580,727	35,337,756	2,145,347

Table 2.—Quantities and Values of Mineral Products from Canadian Sources
1930 and 1931

		1930		1931		Per cent Increase (+) or Decrease (-)	
		Quantity	Value \$	Quantity	Value \$	Quantity	Value
METALLICS							
Arsenic (As ² O ³).....	lb.	4,524,220	129,527	3,575,936	135,170	-21.0	+ 4.4
Bismuth.....	lb.	12,732	6,366	118,207	157,650		-46.4
Cadmium.....			337,871		180,958		-46.4
Cobalt.....	lb.	694,163	1,144,007	521,051	651,179	-24.9	-43.1
Copper.....	lb.	303,478,356	37,948,359	292,304,390	24,114,065	-3.7	-36.5
Gold.....	fine oz.	2,102,068	43,453,601	2,693,892	55,687,688	+28.2	+28.2
Lead.....	lb.	332,894,163	13,102,635	267,342,482	7,260,183	-19.7	-44.6
Manganese ore.....	tons	273	1,356		2,893	57.1	+113.3
Molybdenite.....	lb.			1,222	280		
Nickel.....	lb.	103,768,857	24,455,133	65,666,320	15,267,453	-36.7	-37.6
Palladium, Rhodium, Iridium, etc.....	fine oz.	34,092	895,867	46,918	1,217,717	+ 37.6	+ 35.9
Platinum.....	fine oz.	34,024	1,543,261	44,775	1,596,900	+ 31.6	+ 3.5
Selenium.....	lb.			21,500	40,850		
Silver.....	fine oz.	26,443,823	10,089,376	20,562,247	6,141,943	-22.2	-39.1
Titanium ore.....	tons	412	1,239	1,509	10,261	+266.3	+228.2
Zinc.....	lb.	267,643,505	9,635,166	237,245,451	6,059,249	-11.4	-37.1
Total.....			142,743,764		118,524,438		-17.0
Non-METALLICS—FUELS							
Coal.....	tons	14,881,324	52,849,748	12,243,211	41,207,682	-17.7	-22.0
Natural gas.....	M cu. ft.	29,376,919	10,289,985	25,874,723	9,026,754	-11.9	-12.3
Peat.....	tons	2,847	10,932	1,674	7,033	-41.2	-35.7
Petroleum, crude.....	brl.	1,522,220	5,033,820	1,542,573	4,211,674	+ 1.3	-16.3
Total.....			68,184,485		54,453,143		-20.1
Actinolite.....	tons	34	437	35	456	+ 2.9	+ 4.3
Asbestos.....	tons	242,114	8,390,163	164,296	4,812,886	-32.1	-42.6
Barytes.....	tons	66	1,484	16	363	-75.8	-75.5
Bituminous sands.....	tons	2,067	8,268	1,015	4,060	-50.9	-50.9
Diatomite.....	tons	554	13,247	1,610	32,789	+190.6	+147.5
Feldspar.....	tons	26,796	268,469	18,343	186,961	-31.5	-30.4
Fluorspar.....	tons	80	1,240	40	620	-50.0	-50.0
Graphite.....	tons	1,535	96,392	548	32,149	-64.3	-66.6
Grindstones.....	tons	830	62,021	621	38,103	-25.2	-38.6
Gypsum.....	tons	1,070,968	2,818,788	863,752	2,111,517	-19.3	-25.1
Iron oxides (ochres).....	tons	6,596	83,873	5,520	49,205	-16.3	-41.3
Magnesite-dolomite.....	tons	13,336	336,162	11,411	295,579	-14.4	-12.1
Manganese, bog.....	tons	275	1,650	77	462	-72.0	-72.0
Mica.....	tons	1,170	96,004	1,339	54,066	+ 14.4	-43.7
Mineral water.....	Imp. gal.	227,141	24,481	217,408	13,324	-4.3	-45.6
Phosphate.....	tons	40	760				
Quartz.....	tons	226,200	418,127	195,724	303,158	-13.5	-27.5
Salt.....	tons	271,695	1,694,631	259,047	1,904,149	-4.7	+ 12.4
Silica brick.....	M	2,418	97,379	900	35,746	-62.8	-63.3
Soapstone.....	tons		50,168		34,439		-31.4
Sodium carbonate.....	tons	364	4,550	712	7,351	+ 95.6	+ 61.6
Sodium sulphate.....	tons		293,847		421,097		+ 43.3
Sulphur*.....	tons	37,730	314,835	50,107	429,457	+ 32.8	+ 36.4
Talc.....	tons	11,841	136,048	11,836	122,644	-0.04	-9.9
Volcanic dust.....	tons	242	4,840	128	2,560	-47.1	-47.1
Total.....			15,217,864		10,893,141		-28.4
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Brick—Soft mud process.....	Face..... M	11,350	247,220	5,476	116,316	-51.8	-53.0
	Common..... M	56,487	861,805	41,177	619,357	-27.1	-28.1
Stiff mud process.....	Face..... M	99,284	2,135,871	77,135	1,752,947	-22.3	-17.9
(wire cut).....	Common..... M	105,225	1,480,965	81,930	1,205,464	-22.1	-18.6
Dry press.....	Face..... M	29,434	604,197	20,149	423,357	-31.5	-29.9
	Common..... M	16,915	208,495	8,688	107,213	-48.6	-48.6
Fancy or ornamental brick.....	M	339	27,649	335	20,773	-1.2	-24.9
Sewer brick.....	M	804	15,299	2,253	43,692	+180.2	+185.6
Paving brick.....	M	9	297	19	682	+111.1	+129.6
Firebrick.....	M	3,789	177,608	2,248	107,597	-40.7	-39.4
Fireclay.....	tons	2,870	25,975	1,233	14,857	-57.0	-42.8
Fireclay blocks and shapes.....			147,309		83,039		-43.6
Hollow blocks.....	tons	165,359	1,667,783	105,635	1,046,634	-36.1	-37.2
Roofing tile.....	No.	3,056	356	6,935	720	+126.9	+102.2
Floor tile (quarries).....	sq. ft.	179,786	56,230	107,499	31,415	-40.2	-44.1
Drain tile.....	M	25,291	687,070	12,518	328,410	-50.5	-52.2
Sewer pipe, copings, fine linings, etc.....			1,721,815		1,508,803		-12.4
Pottery, glazed or unglazed.....			294,866		257,725		-12.8
Bentonite.....	tons	74	1,396	187	935	+152.7	-33.0
Other clay products.....			231,372		171,952		-25.7
Total.....			10,593,578		7,841,288		-26.0
Cement.....	brl.	11,032,538	17,713,067	10,161,658	15,826,243	-7.9	-10.7
Lime.....	tons	490,802	4,038,698	344,785	2,764,415	-29.8	-31.6
Sand and gravel.....	tons	28,547,511	8,344,913	21,748,586	6,651,165	-23.8	-20.3
Slate.....	tons	150	3,000	250	5,000	+ 66.7	+ 66.7
Stone—							
Granite.....	tons	1,851,132	3,379,951	1,190,887	2,763,050	-35.7	-18.3
Limestone.....	tons	7,732,675	8,075,616	6,262,430	6,305,538	-19.0	-21.9
Marble.....	tons	26,089	809,582	20,442	668,713	-21.6	-17.4
Sandstone.....	tons	384,610	769,060	924,101	1,332,883	+140.3	+73.3
Total.....			43,133,887		36,317,007		-15.8
Grand total.....			279,873,578		228,029,018		-18.5

*Sulphur content of pyrites shipped and estimated sulphur contained in the sulphuric acid made from bessemer gases.

†Includes grindstones, pulpstones and scythestones.

ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR 1931

CHAPTER ONE

General Review.—The almost continuous and widespread expansion and prosperity experienced throughout the Canadian mining industry during recent years was severely affected during the world wide business depression of 1930 and 1931. Falling prices and decreased consumption resulted in a recession from our high record production value of \$310,850,246 in 1929 to \$228,029,018 in 1931, or a decrease of 26·7 per cent. The total for 1931 represents a value of \$21.97 per capita. In a survey of the major mineral groups we find general decreases in value as compared to the previous year; this was due to exceptionally low metal prices and a lessened demand. Metals retained a position of premier importance with a total value of \$118,524,439, this was a decrease for this group of 17 per cent from the corresponding value for 1930. Fuels, including coal, peat, natural gas and petroleum, attained a combined value of \$54,453,143, a decrease of 20 per cent; the other important division of the non-metallics represented largely by silicates, sulphates and various rock forming minerals, registered an output valuation of \$10,893,141, or 28·4 per cent less than in 1930; clay products were appraised at \$7,841,288, or 26 per cent below the 1930 valuation of \$10,593,578; cement and other structural materials valued at \$36,317,007, were 15·8 per cent less than last year.

Capital employed in the mining industry in Canada during 1931 amounted to \$842,060,020; this wealth, in addition to supplying operating funds for active companies, was utilized in equipping and developing the metallurgical plants and mines of the nation.

This great and highly developed industry, with its varied and far flung activities, supported 72,809 employees in the operation of mines, oil fields, smelters, refineries, mills, quarries, and other associated spheres of mineral production; salaries and wages amounted to \$91,969,299.

Early history of Canadian mining, gleaned from records of the period of the French regime, is closely interwoven with that of the first European navigators and explorers to reach our shores. In 1604 discoveries in Nova Scotia of iron and silver were reported to have been made in St. Mary's Bay and later, copper was found at Cape d'Or. These minerals were located by Master Simon, a mining engineer, in the employ of the celebrated explorer, Champlain. A natural history of Acadia, written by Nicholas Denys, and published in Paris in 1672 mentions the discovery of coal in Nova Scotia and is the first reference to the occurrence of this mineral in North America; metallurgical operations involving the smelting of bog and other iron ores were carried out on the St. Maurice river and other points along the north shore of the St. Lawrence as early as the year 1730. Other mineral discoveries followed closely the water routes of both the early French and British explorers. Argentiferous galena was found, some two hundred years ago, on the shores of Lake Temiskaming, Quebec, within a few miles of the present mining operations in the Cobalt silver camp.

In the far west coal was found at Fort Rupert in 1835 and placer gold was discovered in 1858 along the Fraser and other rivers in British Columbia; these early events in the mining history of this province were forerunners to the more important development of large copper and silver-lead-zinc ore bodies, a development made possible largely through the construction of trans-continental railroads.

Almost coincident with these western events were the pioneer efforts of the eastern provinces to establish mining and metallurgical industries capable of supplying the metal requirements of a virile and increasing population. During the period from 1843-1870 iron and copper ores were produced in Ontario and Quebec. Gold ores were discovered and mines operated in Hastings county, Ontario; iron furnaces were constructed at Three Rivers, Radnor Forges and Drummondville, Quebec, where bog iron was the principal ore treated and charcoal was usually employed as fuel. Placer gold deposits were discovered in the basin of the Chaudière river in Quebec in 1823.

Railroad construction in Canada has proven a very important factor in the development of the Canadian mining industry. This work was almost directly responsible for the discovery of the Sudbury nickel ores in 1883 and the silver ores of the Cobalt mining camp in 1903. The importance of the nickel deposits to the industrial life of Canada was especially emphasized during recent years by the magnitude of the expansion program in the mining and metallurgical operations of the International Nickel Company at Sudbury.

In 1886 mineral production in the Dominion amounted to \$10,000,000 or approximately \$2.23 per capita. Following the sensational placer gold discoveries in the Yukon in 1896 and 1897, production amounted to \$66,000,000 or \$12.16 per capita. A steady increase in the value of mineral production is recorded from 1904 to 1918, some annual declines were experienced during the post war depression period. These, however, were only transitory and with the increasing flow of wealth, largely from the mines of Rouyn, Thetford, Porcupine, Kirkland Lake, Sudbury, Northern Manitoba, Southern British Columbia and the Pacific coast, Canada has attained a position of prominence in the mining industry of the world, a position which, in 1931, established her first in asbestos and nickel, second in gold and cobalt, third in silver and copper and fourth in lead and zinc.

Metallics.—Metallic mineral production totalled \$118,524,439 in 1931 as compared with \$142,743,764 during the previous year.

Arsenic (As_2O_3) production amounted to 3,575,936 pounds valued at \$135,170; this came entirely from silver-cobalt-arsenic ores treated at Deloro, Ontario, by the Deloro Smelting and Refining Company, Ltd. This output was 948,284 pounds less than that of 1930. The decrease was partially accounted for by the cessation of production of arsenical concentrates in British Columbia by the Hedley Gold Mining Company.

Bismuth produced during 1931 totalled 118,207 pounds worth \$157,650 as compared with 12,732 pounds valued at \$6,366 in 1930. The 1931 production represents the metal recovered in the Trail plants of the Consolidated Mining and Smelting Company and that contained in silver-lead-bismuth bullion exported by the Deloro Smelting and Refining Company.

Cadmium was produced commercially in Canada for the first time in 1928. During 1931 the Canadian output amounted in value to \$180,958 as against a value of \$337,871 in 1930. The output of this metal, until the present time, represents a by-product in the electrolytic refining of zinc by the Consolidated Mining and Smelting Company at Trail, British Columbia. Cadmium precipitate amounting to 2,166 tons was produced and stock piled at the Flin Flon zinc refinery of the Hudson Bay Mining and Smelting Company; this will be treated in 1932.

Cobalt at 521,051 pounds and a valuation of \$651,179 represents a decrease of 173,112 pounds in quantity and \$492,828 in value from the production in 1930. This decrease was occasioned largely by the curtailment in mining of silver-cobalt ores owing to the extremely low price for silver, depletion of ore reserves and general industrial depression.

Copper from various primary sources of the metal in Canada amounted to 292,304,390 pounds valued at \$24,114,065, a considerable decrease in both quantity and value from the high record production of 303,478,356 pounds worth \$37,948,359 in 1930. The 1931 output was, however, greater than that in 1929. The copper industry in 1931 suffered extensively through the lowest copper prices in history, the average New York price for electrolytic copper being 8.116 cents per pound as compared with 12.982 cents in 1930. Lower copper outputs for Ontario and Quebec were due largely to reductions in the production of this metal by the International Nickel Company of Canada, Limited and Noranda Mines Limited. Manitoba was the only province to record an increased copper output in 1931, this reflects the first full year's operations of the

new Flin Flon smelter of the Hudson Bay Mining and Smelting Company, together with the commencement of production by the Sherritt-Gordon mine. In British Columbia the non-operation of the Copper Mountain mine by the Granby Consolidated Mining and Smelting Co. Ltd., was the greatest contributing cause of the lessened production of copper in that province. Electrolytically refined copper was produced in 1931 by the Ontario Refining Company Ltd., at Copper Cliff, Ontario, and by the Canadian Copper Refiners Ltd., at Montreal East, Quebec.

Gold production during 1931, from all primary sources in Canada, amounted to 2,693,892 fine ounces valued at \$55,687,688 as compared with an output of 2,102,068 fine ounces valued at \$43,453,601 in 1930, an increase of 28.2 per cent. Six provinces and the Yukon Territory produced gold in 1931 as follows: Nova Scotia, 460 fine ounces; Quebec, 300,075 fine ounces; Ontario, 2,085,814 fine ounces; Manitoba, 102,969 fine ounces; Alberta, 195 fine ounces; British Columbia, 160,069 fine ounces; and the Yukon, 44,310 fine ounces. The 1931 Canadian gold production constitutes a new high record in the gold mining industry of the Dominion and for the second consecutive year establishes Canada in the position of the second largest gold producing country in the world. Gold is now Canada's most valuable mineral output even surpassing coal which retained the premier position for so many years. International repatriation of credits on a large scale forced Great Britain off the gold standard in 1931; this suspension of specie payments by Great Britain was followed by a heavy discount of the Canadian dollar in New York. This re-acted almost immediately to the benefit of the Canadian gold producer. In order to meet maturing obligations abroad the Canadian government took steps to purchase the gold production of the larger Canadian mines and after October, 1931, exports of gold from Canada were permitted only under license.

Lead production in 1931 amounted to 267,342,482 pounds valued at \$7,260,183. This output is 19.7 per cent less in quantity than for the previous year, a lessened demand by the metal consuming industries combined with abnormally low lead prices accounted for this decrease in production. At Galetta, Ontario, the Kingdon Mining, Smelting and Manufacturing Company operated the Kingdon mine and smelter until August when both mine and smelter were closed down. Metal from the Trail plant of the Consolidated Mining and Smelting Company Limited continues to constitute the greater part of the annual lead production of Canada. Ore production at the large Sullivan mine, operated by the same company, was some 300,000 tons less than the previous year, the general reduction in tonnage was attained by working fewer days per month and retaining as nearly as possible a maximum crew.

Nickel production, in common with that of most other metals, reflected the world wide business depression of 1931; output of this metal from ores of the Sudbury area and, to a much smaller extent, from the cobalt-silver mines of Cobalt, Gowganda and South Lorraine, amounted to 65,666,320 pounds valued at \$15,267,453 as compared with 103,768,857 pounds worth \$24,455,133 in 1930. The 1931 output includes the nickel in matte exported by the International Nickel Company Ltd., and Falconbridge Nickel Mines Ltd.; refined and electrolytic nickel produced at Port Colborne, Ontario, and nickel in nickel oxides made by the International Nickel Company and Deloro Smelting and Refining Company.

Silver obtained as a primary metal from all sources in Canada during 1931 totalled 20,562,247 fine ounces valued at \$6,141,943 as against 26,443,823 fine ounces worth \$10,089,376 in 1930. Producers of both silver-lead and cobalt-silver ores in Canada during 1931 suffered considerably through the almost unprecedented decline in the price of metals and it is indeed a great credit to the Canadian miners of these ores that operations were so successfully conducted under such adverse conditions as existed throughout the metal markets of the world. Production in Canada by provinces during 1931 was as follows: Nova Scotia, 48 fine ounces; Quebec, 530,345 fine ounces; Ontario, 7,438,951 fine ounces; Manitoba, 836,547 fine ounces; Alberta, 29 fine ounces; British Columbia, 8,061,599 fine ounces; and the Yukon, 3,694,728 fine ounces. The period under review witnessed the cessation of mining operations at some of the more noted mines of the Cobalt area; the majority of the British Columbia silver-lead producing mines either greatly curtailed their operations or closed down. Probably the most outstanding event in the silver recovery operations of 1931 was the great increase recorded in the silver production for Manitoba; this resulted from the treatment of increasing quantities of argentiferous blister copper at the Flin Flon smelter.

Zinc production in 1931 amounted to 237,245,451 pounds valued at \$6,059,249. This quantity is 11.4 per cent less than the high record production of the previous year. Zinc, in common with most other base metals, suffered from the general decline in metal prices during 1931. The average London price for zinc in 1930 transposed into Canadian funds at par, was 3.6 cents per pound while in 1931 the price based on the same market and with an adverse exchange was only 2.554 cents per pound.

The total primary zinc production of the Dominion in 1931 consisted of the refined zinc produced by the Consolidated Mining and Smelting Company at Trail, British Columbia, and by the Hudson Bay Mining and Smelting Co. Ltd. at Flin Flon, Manitoba. No zinc ores were exported during 1931.

Fuels and Other Non-Metallics.—This division of Canadian mineral production, including among its more important items—coal, natural gas, petroleum, asbestos, gypsums and salt—realized in 1931 a valuation of \$65,346,284. This represents a decrease from 1930 of 21.6 per cent.

Coal production from Canadian mines in 1931 totalled 12,243,211 tons valued at \$41,207,682, a decline of 17.7 per cent in quantity and 22 per cent in value from the 1930 output of 14,881,324 tons worth \$52,849,748. The 1931 production included 8,861,360 tons of bituminous coal, 471,343 tons of sub-bituminous coal and 2,910,508 tons of lignite coal. Mines in operation during the year produced only 60 per cent of their possible output as compared with 70 per cent in 1930. Nova Scotia's output declined 20.7 per cent; New Brunswick's, 13 per cent; Alberta's, 20.7 per cent; and British Columbia's, 10 per cent. Saskatchewan's output increased 14.4 per cent and that of the Yukon, 38.4 per cent. During 1931 exportations of coal totalled 359,853 tons or only 32.3 per cent of the 1927 total. Coal imports into Canada decreased 23.2 per cent to 13,531,831 tons in 1931 as compared with 17,620,074 for the previous year. The decline in employment in the coal mining industry is clearly shown in the number of man-days work done during the year, namely, 4,891,541 as compared with 6,076,684 in 1930 and 7,117,692 in 1929.

Natural gas production in 1931 from fields in New Brunswick, Ontario, Manitoba and Alberta totalled 25,874,723 thousand cubic feet valued at \$9,026,754 as compared with the high record production of 29,376,919 thousand cubic feet worth \$10,289,985 in 1930. Production from the Alberta wells declined 14.2 per cent in 1931, that from Ontario wells, 6.9 per cent, and in New Brunswick, 0.9 per cent. Alberta's average daily output of natural gas in December was estimated at 382,000 thousand cubic feet of which approximately only 10 per cent was utilized.

Crude petroleum produced from wells in New Brunswick, Ontario, and Alberta in 1931 established a new high record for the quantity of crude oil produced in the Dominion. The value at \$4,211,674 was, however, \$822,146 less than for the previous year. The various Canadian fields yielded 1,542,573 barrels in 1931, thus maintaining the unbroken series of annual increases in the Canadian production of crude petroleum since 1925. This increasing output of Canadian crude oil is largely the result of the successful development of the Turner Valley field in Alberta. Other producing fields in Alberta in 1931, were the Red Coulee and Wainwright-Ribstone. During the first six months of 1931 Canada's petroleum output recorded an increase of 46.6 per cent over the total for the corresponding period of 1930; owing to the lessened demand for crude naphtha and to the provincial governments natural gas conservation measures, the production from the Turner Valley field revealed a considerable decline during the last six months of the year.

Asbestos shipments in Canada during 1931 amounted to 164,296 tons valued at \$4,812,886 as compared with 242,114 tons valued at \$8,390,163 in 1930 and 306,055 tons valued at \$13,172,581 in 1929. These figures represent a decrease of 32 per cent in volume and of \$3,577,277 or almost 43 per cent in value from the production of 1930, and of 141,759 tons or 46 per cent in volume and \$8,359,695 or 63 per cent in value as compared with 1929. The tonnage shipped in 1931 was the smallest since 1922 and the value the lowest recorded since 1915. There was a decrease in the price of all grades of asbestos. The average value of all fibres shipped was \$29.29 per ton as compared with \$34.65 and \$43.04 for 1930 and 1929, respectively. This great drop in the average price is due to several causes, chief of which is the fact that the asbestos industry is continuing to feel keenly the effects of the economic depression; its prosperity is dependent on the welfare of the numerous industries it serves. The increasing competition of Russian and Rhodesian fibres has aggravated the situation and has contributed to price reduction, the domestic short fibre industry has not yet been affected by this competition.

Gypsum produced from deposits in Nova Scotia, New Brunswick, Ontario, Manitoba and British Columbia totalled 863,752 tons valued at \$2,111,517 as against 1,070,968 tons valued at \$2,818,788 in 1930 and 1,211,689 tons with a value of \$3,345,696 in 1929. These data reflect the general and intensified industrial depression existing throughout 1930 and 1931. Gypsum quarried in Canada during 1931 totalled 882,880 tons of which 167,335 tons or 19 per cent were calcined in Canada, an increase of 3.6 per cent in domestic calcining over 1930. Exports of crude gypsum or plaster during 1931 totalled 618,765 tons valued at \$741,376, this went entirely to the United States. Plaster of Paris, ground, and prepared wall plasters exported in 1931 amounted to 3,085 tons worth \$50,774, these consisted chiefly of shipments to New Zealand and the United States.

Salt output in Canada in 1931 amounted to 259,047 short tons. This represents a decrease of 4.7 per cent from the 1930 production. The value in 1931 at \$1,904,149 was, however, greater by 12.4 per cent than the 1930 valuation of \$1,694,631. Shipments in 1931, exclusive of the salt content of brine used in the manufacture of chemicals, averaged \$11.20 per ton as compared with \$10.05 per ton in 1930. Price advances contributing to the increase in valuation over the previous year were principally confined to table, dairy and common fine, grades. Exports of Canadian salt during 1931 totalled 6,126 tons as against 8,758 tons in 1930. Imports of salt totalled 130,895 tons valued at \$751,938 as compared with 128,385 tons worth \$660,903 in the previous year.

In the non-metallic group are several other minerals of economic importance. These are represented largely by sulphates, carbonates, silicates and various rock forming minerals. Shipments of Canadian feldspar by Canadian producers amounted to 18,343 short tons valued at \$186,961 as compared with 26,796 short tons worth \$268,469 in 1930 representing a decrease of 31.5 per cent in quantity and 30.4 per cent in value. Mica production for 1931 totalled 1,339 tons valued at \$54,066 as against 1,170 tons worth \$96,004 during the previous year. The decrease in value was due largely to the marketing of lower priced grades of thumb-trimmed mica. There were also decreases in the price per pound of scrap and splittings. Decreased productions were recorded for barytes, bituminous sands, fluorspar, graphite, grindstones, iron oxides (ochres), magnesite, bog manganese, mineral waters, quartz, silica brick, soapstone, talc and volcanic dust. Increases were registered for actinolite, diatomite, sodium carbonate, sodium sulphate and sulphur.

Clay Products and Other Structural Materials.—In 1931 as in 1930 there was a distinct curtailment in the general production of structural materials and the 1931 output as compared with the previous year revealed losses in the output of all items in these groups with the exception of paving brick, roofing tile and slate. The value of clay and clay products manufactured from domestic clay and sold by Canadian producers during 1931 declined 26 per cent below the 1930 sales. Production during the year totalled \$7,841,288 as compared with \$10,593,578 in 1930. Cement shipments in 1931 from plants located in Quebec, Ontario, Manitoba, Alberta and British Columbia totalled 10,161,658 barrels valued at \$15,826,243 as compared with 11,032,538 barrels worth \$17,713,067 in 1930 and 12,284,081 barrels valued at \$19,337,235 during 1929. Quebec mills produced 48.6 per cent of the total Canadian production; Ontario, 34.1 per cent; Manitoba, 5.4 per cent; Alberta, 6.2 per cent; and British Columbia, 5.7 per cent. Sand and gravel production in 1931 amounted to 21,748,586 tons valued at \$6,651,165 as compared with 28,547,511 tons worth \$8,344,913 in 1930. Lime produced during 1931 totalled 344,785 tons worth \$2,764,415 both quantity and value were less than for the preceding year. Stone production for 1931 was worth \$11,070,184 as against \$13,034,209 in 1930. Of the total 1931 output the province of Quebec produced 53.2 per cent; Ontario, 26 per cent; British Columbia, 9.7 per cent; Manitoba, 5.8 per cent; and the balance came from the other provinces.

The Provinces and Territories

Nova Scotia with a mineral output constituting 9.2 per cent of the total for Canada in 1931 and valued at \$21,080,746 is fifth in importance as a mineral producing province. Nova Scotia is now the principal producer of coal, barytes, diatomite, gypsum, manganese ore and silica brick. Coal is the most important item in the mineral production of the province. This product in 1931 totalled 4,955,563 tons valued at \$19,016,720. A few gold mines in the province reported small productions for 1931.

New Brunswick in 1931 yielded mineral wealth amounting to \$2,176,910. This province is chiefly a producer of the non-metallics and during the year shipped or produced coal, natural gas, crude petroleum, gypsum, manganese ore, grindstones, bog manganese, clay products, lime, stone, and sand and gravel. Assistance of the federal Government for coal, now amounts to one-sixth of one cent per ton per mile on movements of coal to the provinces of Quebec and Ontario.

Quebec in 1931 attained the position of the second greatest mineral producing province in the Dominion. The value of the 1931 output totalled \$35,696,563 or 15.7 per cent of the total for Canada. The value of the non-metallic mineral production, excepting structural materials, and largely comprised of asbestos values, has, until recent years, been much greater than that of the metals. This is now reversed and in 1931 the value of metal production totalling \$12,094,930 was \$4,236,411 greater than the combined values for fuels, non-metals and clay products.

This increase in the value of Quebec's mineral production is the result of the successful development of gold and base metal mines situated in the Rouyn and other areas of the north-western part of the province. Especially does it reflect the important copper and gold production by Noranda Mines Limited. This province in 1931 produced 23.4 per cent of Canada's copper and 11.1 per cent of the gold.

Ontario, with a wide variety of economic ore deposits, more particularly those of the mining camps of Sudbury, Porcupine and Kirkland Lake, is endowed with a generous reserve of mineral wealth. The value of Ontario's mineral production in 1931 constituted 42.1 per cent of the total for the Dominion. The 1931 production valued at \$96,113,235 was \$17,417,741 less than in 1930, a loss occasioned by the general economic depression. The gold production for the province was valued at \$43,117,600 as compared with \$35,886,552 in 1930. This increasing gold output is proving of very great benefit, not only in the mining industry itself, but to the province and entire nation. As compared with the previous year, losses were experienced in all of the major mineral groups, including metallics, non-metallic minerals including fuels, clay products and structural materials. The principal activities of the industry in Ontario during the year appeared to be concentrated on the development of and search for new gold bearing deposits.

Manitoba's mines and associated mineral industries yielded in 1931 mineral wealth valued at \$9,965,854 or 4.4 per cent of the Canadian total. This production is considerably larger than the previous year's output which was appraised at \$5,453,182. The first year's continuous operation of the new Flin Flon metallurgical plants of the Hudson Bay Mining and Smelting Company was the greatest contributing cause of this increase. Ores from the Flin Flon and Sherritt-Gordon mines were treated in these plants, the latter mine coming into production for the first time in 1931. There was also a stimulated search for and development of gold properties in 1931. Increases were recorded for non-metallics including fuels; clay products and structural materials registered decreases as compared with the productions of the preceding year.

Saskatchewan produces no metalliferous ores; metal-bearing deposits are known to exist in the northern parts of the province and some prospecting and exploratory work has been carried out in certain of these northern sections; the present mineral production of the province comes almost entirely from operations in the coal, clay products, structural materials and natural salts industries. In 1931 the total value of the Saskatchewan mineral production was \$1,931,880 as compared with \$2,368,612 for 1930. Decreases were registered for fuels, clay products and structural materials. Other non-metallics as a group showed an increase of \$124,970 over the previous year; this was largely due to an increased output of natural sodium sulphate.

Alberta in 1931 had a total mineral production valued at \$23,580,727 as compared with \$30,427,742 in 1930. Alberta was the leading fuel producing province in Canada—during 1931 the value of coal amounted to \$13,342,675; natural gas, \$4,067,893; and petroleum, \$3,976,220. Oil and gas wells, especially in the southern sections of the province, are important contributors to the mineral production of Alberta. Technical research as to the economic importance of the very extensive deposits of bituminous sands in the Fort McMurray district, was continued in 1931.

British Columbia, third in importance among the mineral producing provinces of Canada, produced in 1931 minerals or primary mineral products valued at \$35,337,756. This is a decrease of 35.7 per cent from the value of the preceding year; of the combined Canadian mineral yield. British Columbia contributed 22.3 per cent of the copper; 39.2 per cent of the silver, 98 per cent of the lead, and 85.2 per cent of the zinc. Included in the wide variety of metals, minerals and products of mineral origin produced in this province are: bismuth, cadmium, copper, gold, lead, platinum, selenium, silver, zinc, coal, diatomite, grindstones, gypsum, iron oxides, pyrites, quartz, sodium carbonate, talc, clay products, cement, lime, and various structural materials.

Among the mineral producing provinces British Columbia in 1931 ranked first in the output value of lead, silver, zinc, grindstones, sulphur and sodium carbonate, second in diatomite, and iron oxides, and third in gold, stone, and sand and gravel.

Yukon mineral production in 1931 was confined to outputs of gold, lead, silver and a small tonnage of coal; the combined values of these outputs totalled \$2,145,347 as compared with a corresponding value of \$2,521,588 in 1930. Gold was recovered from alluvial deposits and the silver-lead production consisted of the metal contained in concentrates shipped to foreign smelters. Two companies operated gold dredges and many individuals and miners working in partnership were engaged in placer mining.

Franklin, Keewatin and Mackenzie, constituting the Northwest Territories of Canada and exclusive of Hudson and Ungava Bays, comprise an area of 1,309,682 square miles, or greater than that of British India. Metal bearing ore deposits, although little developed, are known to occur in several areas; wells drilled in the vicinity of Fort Norman on the lower Mackenzie river are reported to have indicated possibilities of this section becoming a future and possibly important oil producing field. Important deposits of lead-zinc ores are known to exist in the vicinity of Great Slave Lake. In 1931 extensive prospecting and surface work were carried out at Echo Bay, Great Bear Lake, on high grade silver-radium ore deposits; these were only discovered in 1930. It is expected this field work will reach production in 1932. In addition to these activities field investigations were conducted on the chalcocite, bornite and other copper ores occurring in the area southwest of Coronation Gulf.

Exploration and prospecting in the Territories has been greatly stimulated and advanced through the adoption of aerial transportation. The efficiency of this mode of travel is strongly emphasized by the large amount of supplies and increasing personnel being transported and the reconnaissance accomplished during recent years as in contrast with the slower and laborious methods by canoe and pack-horse.

Industrial Review

Industrial data relating to the mining industry in Canada reveal that operating mines, smelters, refineries, oil and gas fields, clay products plants, cement mills, sand and gravel properties, and stone quarries represented a total capital investment of \$842,060,020 in 1931. Information pertaining to 1931 mining activities was collected from 2,397 firms, returns showed that the entire mining industry afforded employment to 72,809 persons, who received in salaries and wages a total of \$91,969,299. Net sales of mineral products amounted to \$238,170,019; this value represents the proceeds from sales and includes the value added by smelting operations. This figure should not be confused with the value of Canadian mineral production for 1931 as given in the half-yearly report, which figure, amounting to \$228,029,018, includes the value of the metals computed at average prices in a recognized world market, together with the reported value of sales of non-metals and structural materials.

The total cost of fuel and electricity used in the mining industry in Canada was \$21,469,348. This figure does not include the coke and coal used in non-ferrous smelting furnaces, which amounted to \$2,674,850 in 1931.

The Bureau's survey shows that of the major groups in the industry, metal mining reported 312 active firms, with a capital investment of \$390,908,034, 25,434 employees, \$41,829,288 in salaries and wages, and \$132,382,304 in income from sales; in comparison with corresponding returns for 1930, gold mining was the only individual member of this group to record an increase. The significance of this is emphasized in the increasing activity and general expansion in all branches of this particular sphere of mining, including production, development and exploration

Producers of primary base metals including copper, nickel, lead and zinc experienced possibly the most distressing market conditions within the history of metal mining. Prices at unprecedented low levels combined with industrial conditions approaching almost a point of stagnation in many parts of the world, have, in many instances, necessitated a drastic curtailment in metal output, resulting in lessened employment and serious loss of purchasing power in some of the more adversely affected districts. Some of the Canadian base metal producers, especially the miners of copper-bearing ores in Central and Eastern Canada, have been fortunate in operating on ores containing appreciable precious metal values. This has proven of considerable assistance in preserving continuous operations, with their attending benefits, to not only the local mining communities but to the country at large.

Returns from the non-metal mining industry and including figures on coal, natural gas and petroleum, show a general recession as a whole from those of the preceding year. This reflects the widespread commercial depression existing throughout the world during 1931; information collected from members of this group for 1931 shows 843 firms, \$325,169,359 in capital invested, 34,075 employees, \$36,031,233 in salaries and wages, and \$61,629,210 as income from sales. Among the recorded values for sales the only members in this group to show increases over 1930 were those of the salt and miscellaneous non-metal industries. Statistics compiled for the clay products and other structural materials industries indicate consistent and sympathetic recessions in common with the other two major mineral producing groups. Figures relating to employment, salaries, wages and sales for each particular industry of this group were below those of 1930; 1,242 firms were reported as active, \$125,983,627 represented capital invested, employment was afforded to 13,300 persons, \$14,108,778 was dispersed in salaries and wages, and \$44,158,295 constituted the value of sales.

A close relationship exists between the production of structural materials and general construction, and it may prove of interest that the value of all Canadian contracts awarded during 1931, as compiled by the MacLean Building Reports Limited, amounted to \$315,482,000 as compared with \$456,999,600 in 1930 and \$576,651,800 in 1929. While these figures reveal a large decrease from 1929, it should be realized that 1929 witnessed the greatest building "boom" in the history of Canada, construction in that year being 22.1 per cent in excess of 1928, the second highest year ever recorded for this industry.

Imports and Exports.—Imports into Canada during the calendar year 1931 of minerals and allied products reached a value of \$292,300,919, as compared with \$493,634,385 in 1930. These consisted of iron and its products valued at \$116,209,368, non-ferrous metals and products worth \$38,666,648; non-metallic minerals and their products valued at \$106,087,909, and chemicals and allied products worth \$31,336,994. In the previous year imports of iron and its products were valued at \$223,691,315; non-ferrous metals, \$68,309,300; non-metallic minerals, \$164,848,720; and chemicals and allied products, \$36,785,050. Exports of similar products during 1931 had a value of \$118,753,813 as compared with \$202,514,838 in 1930. The 1931 exports of iron and its products were valued at \$19,086,492 as against \$47,565,525 in the previous year; non-ferrous metals \$73,841,502 as against \$115,766,626; non-metallic minerals \$14,976,873 as against \$22,862,181, and chemicals and allied products \$10,848,946, as compared with \$16,320,506 during the year ending December 31, 1930.

An analysis of Canada's external trade in these four groups during 1931 shows that the value of imports from the United States amounted to \$230,818,456, or 79 per cent of the total imported from all foreign sources; \$33,145,853, or 11 per cent of the value of purchases represented goods from the United Kingdom, and the remainder was derived from other countries, chief among which were Belgium, Germany, France, Sweden, Japan, Czecho-Slovakia and Netherlands.

Of the total exports of these same groups, \$58,629,024, or 49 per cent, went to the United States and \$37,779,306, or 32 per cent, to the British Empire. Of the latter, the United Kingdom, South Africa, India, New Zealand and Australia were the largest purchasers. Among the remaining countries the largest importers were Japan, Germany, France, China, Netherlands, Argentina, Belgium and Portuguese East Africa.

The largest items among Canada's exports of iron and its products in 1931 were automobiles and automobile parts valued at \$6,600,000 as compared with \$20,400,000 in 1930, and farm implements at \$2,900,000 as against \$10,000,000 during the preceding year; among the non-ferrous metals, gold, silver, and platinum in the form of bullion, ore, etc., were valued at approximately \$24,500,000; nickel in its various forms, \$14,000,000; pig lead and lead in ore, \$4,700,000; copper in blister form, in ores exported bars, rods, wire, scrap, etc., \$17,150,000; zinc spelter, scrap, etc., \$5,600,000; and aluminium in bars, blocks, scrap, and in manufactured form, \$4,500,000.

Among the exports of the non-metallic mineral products, asbestos ranked first, with a valuation of \$5,300,000; coal exports amounted to about \$2,000,000; artificial abrasives totalled \$2,000,000; crude petroleum and its products were appraised at \$1,800,000; and gypsum exports for the year possessed a value of \$740,000.

The more important items exported in the chemicals and allied products group were cyanamide at \$1,500,000; acids at \$2,000,000; soda and sodium compounds, \$2,850,000; cobalt oxides and salts, \$417,000, and ammonium sulphate, \$168,000.

Prices.—As the result of generally lower prices in the non-ferrous and non-metallic mineral groups, the index for articles of mineral origin, raw and partly manufactured, again moved downward. From an opening of 80·9 (on the base 1926 = 100) this series gradually declined to 75·4 in July, but rose steadily from then till December, when the figure was 81·1. The yearly average for 1931 was 77·9, as compared with 86·1 for the previous year. Price reductions for antimony, silver, lead, tin and zinc, were chiefly responsible for the non-ferrous metals index dropping from 80·7 in 1930 to 64·6 in the following year.

Fine silver at New York averaged 38·1c. in 1930 and 30·0c. per ounce (Canadian funds) in 1931. Electrolytic, domestic, copper fell from \$14.98 to \$10.01, domestic lead from \$5.50 to \$4.17, and domestic zinc from \$5.08 to \$3.96 per 100 pounds, carlots, f.o.b. Montreal. Tin ingots declined from 35·2c. to 28·1c. per pound, f.o.b. Toronto. The index for the non-metallic group fell from 91·3 in 1930 to 86·5 in 1931, due chiefly to price recessions for asbestos, imported and domestic bituminous coal, and gasoline. Crude asbestos, No. 1, dropped from \$570.83 to \$466.67, and No. 2 from \$362.50 to \$251.67 per ton, f.o.b. mine. Mill board and paper stocks moved down from \$34.17 to \$30.00 and fillers, floats and other short fibres from \$14.50 to \$10.67 per ton, f.o.b. mine. Gasoline averaged lower and was quoted at the following prices, at various Canadian centres: Toronto, 1930 price 19·3c and 1931 price 16·9c.; Montreal, 20·3c. and 17·8c.; Winnipeg, 21·0c. and 18·8c.; and Vancouver, 23·0c. and 19·5c. per gallon for these respective years. Imported bituminous coal, run-of-mine, declined from \$5·86 to \$5·71, and slack from \$5.38 to \$5.21 per ton, ex yard, Montreal.

Table 3.—Exchange Table Showing Average Monthly Quotations for New York Funds at Montreal, 1927-1931

Month	1927	1928	1929	1930	1931
	\$	\$	\$	\$	\$
January.....	1·0016	1·0018	1·0027	1·0134	1·0020
February.....	1·0016	1·0019	1·0038	1·0060	1·0002
March.....	1·0037	1·0000	1·0060	1·0021	1·0002
April.....	0·9990	0·9997	1·0076	1·0004	1·0004
May.....	0·9993	1·0009	1·0068	1·0017	1·0005
June.....	1·0006	1·0024	1·0083	1·0000	1·0026
July.....	1·0015	1·0021	1·0049	0·9914	1·0032
August.....	1·0006	1·0000	1·0056	0·9990	1·0030
September.....	0·9995	0·9996	1·0076	0·9984	1·0429
October.....	0·9989	1·0003	1·0144	0·9989	1·1237
November.....	0·9986	0·9999	1·0157	0·9989	1·1234
December.....	1·0010	1·0021	1·0078	1·0023	1·2105
Average.....	1·0005	1·0009	1·0076	1·0015	1·0432

Table 4.—Metal Prices, 1927-1931

Commodity	Market	1927	1928	1929	1930	1931
		\$	\$	\$	\$	† \$
Antimony (ordinaries).....	New York.....	0.12393	0.10305	0.08956	0.07667	0.06720
Arsenic, white.....	New York.....	0.0383	0.04	0.04	0.04	0.04
Cobalt.....	New York.....	2.50	2.63	2.52	2.50	2.50
Cobalt oxide.....	New York.....	2.10	2.10	2.10	2.00	1.75
Copper.....	New York.....	0.12920	0.14570	0.18107	0.12982	0.08116
	Montreal.....	0.1478	0.16402	0.19978	0.1498	0.10006
	New York.....	0.06755	0.06305	0.06833	0.05517	0.04243
Lead.....	Montreal.....	0.0673	0.0606	0.06678	0.05496	0.04168
	Toronto.....	0.0683	0.06206	0.06775	0.056	0.04238
	London.....	0.05256	0.04576	0.05054	0.03927	12.958
Nickel.....	New York.....	0.36	0.36	0.35	0.36	0.36
Platinum.....	New York.....	84.636	78.580	67.655	45.358	35.665
Silver.....	New York.....	0.56370	0.58176	0.52993	0.38154	0.2870
Tin*.....	New York.....	0.62747	0.50427	0.45155	0.31694	0.24467
	St. Louis.....	0.06242	0.06027	0.06512	0.04556	0.03640
Zinc.....	Montreal.....	0.07710	0.07144	0.0687	0.05084	0.03961
	London.....	0.06194	0.05493	0.05386	0.03600	12.215

* Years 1927-30 prices for Straits.

† All quotations in dollars with the exception of lead and zinc in London for 1931 which are given in pounds sterling per long ton.

Table 5.—Annual Values of the Mineral Production of Canada, 1922-1931

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1922.....	184,297,242	20.55	1927.....	247,356,695	25.99
1923.....	214,079,331	23.41	1928.....	274,989,487	28.07
1924.....	209,583,406	22.71	1929.....	310,850,246	31.28
1925.....	226,583,333	24.19	1930.....	279,873,578	27.65
1926.....	240,437,123	25.61	1931.....	228,029,018	21.97

NOTE.—For years 1886 to 1921 see previous reports.

Table 6.—Annual Values of the Mineral Production of Canada by Classes, 1922-1931

Year	Metallics	Non-metallics including fuels	Clay products and other structural materials	Total
	\$	\$	\$	\$
Canada—				
1922.....	61,785,707	82,976,794	39,534,741	184,297,242
1923.....	84,391,218	91,936,732	37,751,381	214,079,331
1924.....	102,406,528	71,796,009	35,380,869	209,583,406
1925.....	117,082,298	71,851,801	37,649,234	226,583,333
1926.....	115,237,581	85,240,144	39,959,398	240,437,123
1927.....	113,561,030	88,986,246	44,809,419	247,356,695
1928.....	132,012,454	93,239,852	49,737,181	274,989,487
1929.....	154,454,056	97,861,356	58,534,834	310,850,246
1930.....	142,743,764	83,402,349	53,727,465	279,873,578
1931.....	118,524,439	65,346,284	44,158,295	228,029,018

NOTE.—For years 1907-1921 see previous reports.

Table 7.—Values of the Mineral Production of Canada by Provinces, 1922-1931

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1922.....	25,923,499	2,263,692	17,647,939	65,866,029	2,258,942	1,255,470	27,872,136	39,423,962	1,785,573
1923.....	29,648,893	2,462,457	20,308,763	80,823,851	1,768,037	1,047,583	31,287,536	43,757,388	2,972,823
1924.....	23,820,352	1,969,260	19,136,504	86,398,656	1,534,249	1,128,100	22,344,940	52,298,533	952,812
1925.....	17,625,612	1,743,858	24,284,527	87,980,436	2,276,759	1,076,392	25,318,866	64,485,242	1,791,641
1926.....	28,873,792	1,811,104	25,956,193	84,702,296	3,073,528	1,193,394	26,977,027	65,622,076	2,226,813
1927.....	30,111,221	2,148,535	28,870,403	89,982,962	2,888,912	1,455,225	29,309,223	60,801,170	1,789,044
1928.....	30,524,392	2,198,919	37,037,420	99,584,718	4,186,853	1,719,461	32,531,416	64,496,351	2,709,957
1929.....	30,904,453	2,439,072	46,358,285	117,662,505	5,423,825	2,253,506	34,739,896	68,162,878	2,905,736
1930.....	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182	2,368,612	30,427,742	54,953,320	2,521,588
1931.....	21,080,746	2,176,910	35,696,563	96,113,235	9,965,854	1,931,880	23,580,727	35,337,756	2,145,347

NOTE.—For years 1899-1921, see previous reports.

Table 8.—Percentage of the Total Value of the Mineral Production of Canada by Provinces, 1927-1931

Province	1927	1928	1929	1930	1931
Nova Scotia.....	12.17	11.10	9.94	9.65	9.24
New Brunswick.....	0.87	0.80	0.79	0.84	0.86
Quebec.....	11.67	13.47	14.93	14.73	15.65
Ontario.....	36.38	36.22	37.85	40.57	42.15
Manitoba.....	1.17	1.52	1.75	1.95	4.37
Saskatchewan.....	0.50	0.63	0.72	0.85	0.85
Alberta.....	11.85	11.83	11.17	10.87	10.34
British Columbia.....	24.58	23.45	21.92	19.64	15.50
Yukon.....	0.72	0.98	0.93	0.90	0.94
Canada.....	100.00	100.00	100.00	100.00	100.00

Table 9.—Mineral Production of Nova Scotia, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold..... fine oz.	2,687	55,545	1,272	26,295	460	9,509
Silver..... fine oz.	132	70	67	26	48	14
Manganese ore..... tons			4	60	60	2,400
NON-METALLICS—						
Barytes..... tons	105	2,341	66	1,484	16	363
Coal..... tons	7,056,133	28,071,956	6,252,552	24,528,860	4,955,563	19,016,720
Diatomite..... tons	254	5,080	398	7,960	1,484	29,679
Grindstones..... tons	6	110	6	110	—	—
Gypsum..... tons	948,895	1,152,160	827,063	982,287	707,817	878,487
Quartz..... tons	11,845	31,388	8,057	18,494	3,116	6,836
Salt..... tons	27,819	157,662	23,058	136,226	27,718	143,761
Silica brick..... M	2,385	93,207	2,040	78,259	621	22,044
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		653,157		495,333		467,126
Lime..... tons	42,001	154,187	31,114	113,250	18,430	79,418
Sand and gravel..... tons	332,599	151,368	525,683	310,407	403,858	198,757
Stone..... tons	264,706	376,222	152,463	320,316	83,181	225,632
Total.....		30,904,453		27,019,367		21,080,746

Table 10.—Mineral Production of New Brunswick, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Manganese ore..... tons			269	1,296	57	493
NON-METALLICS—						
Coal..... tons	218,706	909,169	209,349	864,118	182,181	743,196
Grindstones..... tons	1,731	103,514	495	35,689	299	12,308
Gypsum..... tons	70,482	485,982	82,674	513,677	58,957	451,264
Manganese, Bog..... tons	300	1,800	275	1,650	77	462
Natural gas..... M cu. ft.	678,456	333,002	661,975	325,751	655,891	323,184
Petroleum..... brls.	7,499	19,909	6,758	17,378	6,577	15,461
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		160,006		162,536		143,348
Lime..... tons	15,518	174,553	12,521	135,304	11,241	127,054
Sand and gravel..... tons	525,857	46,167	357,551	41,303	183,475	18,149
Stone..... tons	27,352	204,970	111,612	284,869	62,325	341,991
Total.....		2,439,072		2,383,571		2,176,910

Table 11.—Mineral Production of *Quebec, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS						
Copper..... lb.	55,337,169	10,019,901	80,310,363	10,425,891	68,376,985	5,723,151
Gold..... fine oz.	90,798	1,876,961	141,747	2,930,170	300,075	6,203,101
Lead..... lb.	5,358,304	270,616				
Molybdenite..... lb. (MoS ²)	16,150	6,400				
Silver..... fine oz.	813,821	431,281	571,164	217,922	530,345	158,414
Titanium ore, sold for export..... tons	2,748	7,359	412	1,239	1,509	10,261
Zinc..... lb.	19,653,440	1,058,731	9,754,160	351,150		
NON-METALLICS—						
Asbestos..... tons	306,055	13,172,581	242,114	8,390,163	164,296	4,812,886
Feldspar..... tons	15,790	133,492	17,074	163,802	10,381	86,842
Graphite..... tons	173	12,652	197	9,850		
Iron oxides..... tons	6,220	113,932	6,590	83,753	5,410	48,205
Magnesite..... tons	18,809	491,170	13,336	336,162	11,411	295,579
Mica..... tons	1,062	72,630	430	61,729	290	30,601
Mineral water..... Imp. gal.	12,205	2,488	12,941	3,727	19,868	4,746
Peat..... tons	1,607	8,839	2,219	9,330	1,170	5,937
Phosphate..... tons	40	800	40	760		
Quartz..... tons	46,444	132,532	49,561	119,668	26,987	69,759
Sulphur..... tons	9,926	73,119	12,653	93,038	14,586	108,617
Talc and soapstone..... tons		47,986		50,168		34,439
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	5,169,408	7,120,374	4,865,609	7,031,528	4,942,323	7,092,895
Clay products.....		3,187,702		2,464,044		2,360,908
Lime—						
Quicklime..... tons	157,714	1,183,148	117,358	874,077	101,186	720,049
Hydrated lime..... tons	9,478	81,046	11,992	93,573	10,310	84,169
Sand and gravel..... tons	6,203,231	1,534,699	6,581,807	1,750,690	7,657,964	1,952,959
Stone..... tons	3,484,471	5,317,859	3,818,126	5,752,786	4,265,529	5,893,042
Total		46,358,285		41,215,220		35,696,563

*There is also in this province an important production of aluminium from imported ores.

Table 12.—Mineral Production of *Ontario, 1929-1931

Product	1929		1930		1931		
	Quantity	Value	Quantity	Value	Quantity	Value	
METALLICS—							
		\$		\$		\$	
Arsenic (As ₂ O ₃).....	lb.	3,742,913	154,887	2,750,887	109,932	3,575,936	135,170
Bismuth.....	lb.	27,446	23,413	12,732	6,366	7,331	3,532
Cobalt.....	lb.	929,415	1,801,915	694,163	1,144,007	521,051	651,179
Copper.....	lb.	88,879,853	14,622,572	127,718,871	15,187,259	112,882,625	9,096,463
Gold.....	fine oz.	1,622,267	33,535,234	1,736,012	35,886,552	2,085,814	43,117,600
Lead.....	lb.	4,769,506	294,431	2,193,856	116,034	985,633	41,647
Molybdenite.....	lb.					1,222	280
Nickel.....	lb.	110,275,912	27,115,461	103,768,857	24,455,133	65,666,320	15,267,453
Palladium, Rhodium, etc.....	fine oz.	17,141	802,453	34,040	894,511	46,918	1,217,717
Platinum.....	fine oz.	12,474	843,928	34,000	1,542,172	44,725	1,595,117
Selenium.....	lb.					16,899	32,108
Silver.....	fine oz.	8,890,726	4,711,462	10,205,683	3,893,876	7,438,951	2,222,014
Zinc.....	lb.	5,516,806	297,190	3,527,894	127,004		
NON-METALLICS—							
Actinolite.....	tons	30	375	34	437	35	456
Beryl Crystals.....	lb.	4,456	114				
Diatomite.....	tons			10	140	60	840
Feldspar.....	tons	21,737	206,979	9,722	104,667	7,962	100,119
Fluorspar.....	tons	70	1,120	80	1,240	40	620
Graphite.....	tons	1,288	90,522	1,338	86,542	548	32,149
Gypsum.....	tons	100,347	832,689	94,946	776,069	53,358	374,469
Mica.....	tons	2,991	45,919	740	34,275	1,049	23,465
Mineral water.....	Imp. gal.	309,700	13,651	214,200	20,754	197,540	8,578
Natural gas.....	M cu. ft.	8,586,475	4,959,695	7,965,761	5,034,828	7,419,534	4,635,497
Peat.....	tons	1,000	4,500	623	1,602	504	1,096
Petroleum.....	brls.	121,194	253,678	117,302	235,746	122,365	219,993
Quartz.....	tons	187,973	316,050	167,487	274,674	97,888	148,642
Salt.....	tons	302,445	1,420,424	248,637	1,558,405	231,329	1,760,388
Silica brick.....	M	1,566	80,374	378	19,120	279	13,702
Sulphur.....	tons	4,579	51,516	7,277	73,855	6,508	65,080
Talc and soapstone.....	tons	15,463	180,492	11,664	133,213	11,806	122,044
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—							
Cement.....	brls.	4,624,712	6,608,246	3,942,690	5,779,404	3,470,056	5,006,826
Clay products.....			6,830,162		5,221,214		3,552,800
Lime—							
Quicklime.....	tons	314,243	2,624,284	209,340	1,673,409	113,376	842,274
Hydrated.....	tons	55,915	740,127	42,726	504,178	34,284	379,996
Sand and gravel.....	tons	11,358,568	3,462,379	12,027,082	3,783,830	7,465,017	2,562,477
Stone.....	tons	5,239,672	4,736,263	5,396,233	4,850,528	3,359,364	2,881,444
Total			117,662,505		113,530,976		96,113,235

*The total production of blast-furnace pig-iron in Ontario in 1929 was 769,359 long tons, in 1930, 534,542 long tons and 318,645 tons in 1931.

†Sulphur content of pyrites shipped or estimated sulphur contained in the sulphuric acid made from Bessemer gases.

Table 13.—Mineral Production of Manitoba, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Copper..... lb.			2,087,609	215,018	45,821,432	3,835,254
Gold..... fine oz.	22,455	464,186	23,189	479,359	102,969	2,128,558
Selenium..... lb.					3,870	7,353
Silver..... fine oz.	2,644	1,401	94,653	36,114	836,547	249,877
Zinc..... lb.			3,882,141	139,757	35,173,749	898,338
NON-METALLICS—						
Coal..... tons					1,306	3,797
Gypsum..... tons	67,269	631,051	34,157	298,297	23,076	231,124
Natural gas..... M cu. ft.	600	180	600	180	600	180
Quartz..... tons	10,045	35,610			67,214	76,624
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	1,000,258	2,350,606	977,906	2,268,742	544,160	1,267,893
Clay products.....		362,240		215,967		122,628
Lime..... tons	32,246	361,104	24,098	260,325	21,014	207,401
Sand and gravel..... tons	1,782,085	322,430	1,253,103	453,944	871,986	294,178
Stone..... tons	192,109	865,017	147,078	1,085,479	153,248	642,649
Total.....		5,423,825		5,453,182		9,965,854

Table 14.—Mineral Production of Saskatchewan, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
NON-METALLICS—						
Coal..... tons	580,189	993,226	579,424	968,863	662,836	945,259
Sodium sulphate..... tons		64,112		293,847		421,097
Volcanic dust..... tons	300	6,000	242	4,840	128	2,560
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		502,522		349,283		166,257
Sand and gravel..... tons	3,496,679	687,646	3,680,553	751,779	1,388,594	396,707
Total.....		2,253,506		2,368,612		1,931,880

Table 15.—Mineral Production of Alberta, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold..... fine oz.	5	103			195	4,031
Silver..... fine oz.					29	9
NON-METALLICS—						
Bituminous sands..... tons	989	3,956	2,067	8,268	1,015	4,060
Coal..... tons	7,150,693	22,928,182	5,765,528	18,063,225	4,564,015	13,342,675
Natural gas..... M cu. ft.	19,112,931	4,684,247	20,748,583	4,929,226	17,798,698	4,067,893
Petroleum..... brls.	988,675	3,458,177	1,398,160	4,780,696	1,413,631	3,976,220
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	808,796	1,770,786	525,289	1,144,160	626,483	1,286,080
Clay products.....		1,342,427		997,685		529,716
Lime..... tons	7,681	79,569	5,136	49,525	5,118	46,785
Sand and gravel..... tons	1,721,930	447,993	1,626,989	433,221	1,050,988	313,616
Stone..... tons	5,183	24,546	7,903	21,736	2,496	9,642
Total.....		34,739,986		39,427,742		23,580,727

Table 16.—Mineral Production of British Columbia, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic As ₂ O ₃ lb.	1,487,175	16,433	1,773,333	19,595		
Bismuth..... lb.	166,883	283,701			110,876	154,118
Cadmium..... lb.	773,976	675,294		337,871		180,958
Chromite..... tons	126	900				
Copper..... lb.	103,903,738	18,772,778	93,318,885	12,114,657	65,223,348	5,459,194
Gold..... fine oz.	154,204	3,187,680	164,331	3,397,023	160,069	3,308,920
Lead..... lb.	307,999,153	15,555,189	321,803,725	12,637,232	261,902,236	7,097,812
Palladium, Rhodium, etc..... fine oz.	177	6,836	52	1,356		
Platinum..... fine oz.	45	2,828	24	1,089	50	1,783
Selenium..... lb.					731	1,389
Silver..... fine oz.	10,156,408	5,382,185	11,825,930	4,512,065	8,061,599	2,408,000
Zinc..... lb.	172,096,841	9,270,857	250,479,310	9,017,255	202,071,702	5,160,911
NON-METALLICS—						
Coal..... tons	2,490,378	10,160,789	2,083,818	8,421,572	1,876,406	7,150,996
Diatomite..... tons	175	5,250	146	5,147	66	2,270
Fluorspar..... tons	17,800	267,000				
Grindstones, pulpstones..... tons	210	2,730	329	26,222	322	25,795
Gypsum..... tons	24,696	243,814	32,128	248,458	20,544	176,173
Iron oxides..... tons	298	2,000	6	120	110	1,000
Manganese, bog..... tons	1	30				
Phosphate..... tons	1,145	4,580				
Quartz..... tons	9,642	45,947	1,095	5,291	519	1,297
Sodium carbonate..... tons	600	8,100	364	4,550	712	7,351
Sulphur..... tons	*28,276	226,208	*17,800	147,942	*29,013	255,760
Talc..... tons	46	720	177	2,835	30	600
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	680,907	1,487,223	721,044	1,489,233	578,636	1,172,549
Clay products.....		866,427		687,516		498,505
Lime—						
Quicklime..... tons	26,300	355,013	27,104	251,479	20,364	195,078
Hydrated..... tons	13,291	155,579	9,413	83,578	9,462	82,191
Sand and gravel..... tons	2,425,996	665,132	2,494,743	819,739	2,726,704	914,322
Slate..... tons			150	3,000	250	5,000
Stone..... tons	408,931	511,655	361,091	718,495	471,717	1,075,784
Total.....		68,162,878		54,953,329		35,337,756

*Sulphur content of pyrites and of acid manufactured from smelter fumes.

Table 17.—Mineral Production of the Yukon, 1929-1931

Product	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Copper..... lb.			42,628	5,534		
Gold..... fine oz.	35,892	741,954	35,517	734,202	44,310	915,969
Lead..... lb.	8,395,603	424,012	8,896,582	349,369	4,454,613	120,724
Silver..... fine oz.	3,279,530	1,737,922	3,746,326	1,429,373	3,694,728	1,103,615
NON-METALLICS—						
Coal..... tons	458	1,848	653	3,110	904	5,039
Total.....		2,905,736		2,521,588		2,145,347

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1927-1931

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
Metal Mining Industry							
ALLUVIAL GOLD MINES							
1927.....	94	96	9,653,723	321	472,596	30,834	794,033
1928.....	82	82	10,384,575	342	538,270	57,178	852,735
1929.....	68	68	7,237,850	488	586,193	2,969	836,006
1930.....	79	79	5,881,620	394	612,369	8,272	877,778
1931.....	109	109	5,908,001	337	682,935	41,745	1,226,541
AURIFEROUS QUARTZ MINES							
1927.....	72	76	118,381,468	8,022	12,935,719	2,222,085	37,452,995
1928.....	98	100	147,693,710	9,066	14,615,990	2,554,657	36,655,330
1929.....	80	85	135,166,105	8,660	14,258,733	2,579,481	37,275,986
1930.....	54	56	119,758,057	8,401	14,034,620	2,364,102	39,771,739
1931.....	68	69	109,933,164	9,636	16,467,165	2,700,326	49,144,578
COPPER-GOLD-SILVER MINES							
1927.....	118	125	24,232,169	4,083	5,260,095	596,137	9,822,881
1928.....	164	174	50,004,340	4,777	6,764,309	731,836	15,281,519
1929.....	144	152	52,546,697	5,243	8,498,755	1,035,133	21,859,907
1930.....	61	68	45,844,395	5,694	9,156,759	1,272,262	15,629,564
1931.....	53	56	37,127,920	3,351	4,958,317	726,502	15,951,103
SILVER-COBALT MINES							
1927.....	23	26	30,123,645	1,458	2,178,163	472,548	4,760,546
1928.....	15	19	22,027,683	1,166	1,809,466	430,683	3,938,884
1929.....	27	32	15,820,435	1,149	1,532,333	407,952	3,918,316
1930.....	23	28	12,268,322	1,043	1,488,591	352,844	3,637,181
1931.....	22	26	9,352,520	786	1,149,689	227,467	1,925,593
SILVER-LEAD-ZINC MINES							
1927.....	157	173	28,036,330	3,106	4,807,817	588,520	17,520,130
1928.....	132	150	38,894,892	3,680	5,531,634	671,564	17,123,455
1929.....	149	168	50,573,661	4,153	6,482,392	793,139	22,748,089
1930.....	86	93	42,053,674	2,866	4,263,961	654,685	13,000,815
1931.....	39	40	31,152,078	1,299	2,149,921	485,106	6,351,975
NICKEL-COPPER MINES							
1927.....	2	6	39,272,609	1,617	2,486,313	120,686	5,223,668
1928.....	4	8	45,659,704	1,963	3,136,838	121,005	5,831,640
1929.....	2	5	19,448,290	3,219	5,105,875	184,369	7,967,640
1930.....	2	5	26,194,605	3,483	5,388,783	200,151	8,460,556
1931.....	3	6	21,320,977	2,133	3,150,240	105,403	7,539,836
MISCELLANEOUS METAL MINES							
1927.....	5	5	641,600	65	23,944	460	8,980
1928.....	5	5	627,060	62	61,886	8,880	6,732
1929.....	8	8	6,050	94	42,837	10,217	6,400
1930.....	10	10	427,906	116	110,096	5,100	2,595
1931.....	7	7	444,179	32	25,694	576	13,434

Table 18.—Principal Statistics of the Mineral Industry in Canada by Industries,
1927-1931—Continued

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
Non-Ferrous Metal Smelting and Refining							
1927.....	8	10	85,366,662	7,671	12,120,240	6,380,127	*45,479,578
1928.....	8	10	120,035,742	7,526	12,228,738	5,180,770	*61,080,477
1929.....	7	10	146,699,085	8,119	13,772,393	6,208,733	*68,438,022
1930.....	10	13	175,010,686	8,626	13,796,124	6,465,897	*55,635,664
1931.....	11	14	175,669,195	7,860	13,245,327	6,053,398	*50,229,454
Total Metal Mining Industries							
1927.....	479	517	335,708,206	26,343	40,234,887	10,411,397	121,062,811
1928.....	508	548	435,327,646	23,582	44,687,131	9,756,573	149,770,772
1929.....	485	528	427,498,173	31,125	50,279,511	11,221,987	163,059,366
1930.....	325	352	427,439,265	30,623	48,851,303	11,323,313	137,015,892
1931.....	312	327	390,908,034	25,434	41,829,288	10,349,523	132,382,514
Non-Metal Mining Industries Including Fuels							
(a) FUELS							
COAL							
1927.....	385	437	146,392,808	29,772	38,955,967	3,558,926	58,439,742
1928.....	380	427	146,835,825	30,256	43,320,811	3,679,721	60,462,687
1929.....	357	413	141,766,727	29,739	42,376,378	3,657,355	59,584,545
1930.....	390	430	140,316,395	29,172	36,442,361	3,595,416	49,905,327
1931.....	412	452	135,712,866	27,860	28,802,428	3,060,487	37,762,927
NATURAL GAS							
1927.....	172	2,290	56,777,091	1,342	1,535,498	11,181	7,689,916
1928.....	155	2,073	62,073,384	1,660	2,105,648	34,396	7,216,054
1929.....	145	2,298	68,592,709	1,953	2,275,147	41,590	8,555,971
1930.....	124	2,280	70,548,353	1,941	2,349,703	33,811	8,447,385
1931.....	145	2,444	71,085,678	1,692	2,072,022	26,921	8,232,822
PETROLEUM							
1927.....	206	2,734	22,773,916	781	1,120,224	112,763	1,516,043
1928.....	190	2,763	31,182,352	1,118	1,916,625	205,183	2,807,528
1929.....	231	2,635	54,526,398	2,221	3,748,689	293,354	4,368,374
1930.....	234	2,324	63,300,244	1,869	3,337,754	363,998	6,481,847
1931.....	160	2,346	57,620,950	1,209	1,634,517	303,511	4,733,287
TOTAL FUELS							
1927.....	763	5,461	225,943,815	31,895	41,611,689	3,682,870	67,645,701
1928.....	725	5,263	240,091,561	33,034	47,343,084	3,919,300	70,486,269
1929.....	733	5,346	264,885,834	35,913	48,400,214	3,992,299	72,608,890
1930.....	748	5,034	274,164,992	32,982	42,129,818	3,993,225	64,834,559
1931.....	717	5,242	264,419,494	30,761	32,608,987	3,390,919	60,729,036

* Value added by smelting. (a) Production of peat for 1927-1931 included in the miscellaneous non-metallics.

Table 18.—Principal Statistics of the Mineral Industry in Canada by Industries, 1927-1931—Continued

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
OTHER NON-METAL MINING INDUSTRIES							
ABRASIVES—NATURAL							
1927.....	9	9	433,810	132	107,603	10,279	132,552
1928.....	9	9	448,618	163	96,558	12,998	119,715
1929.....	9	9	790,791	154	152,805	18,942	122,684
1930.....	10	10	345,102	45	42,867	4,305	80,108
1931.....	8	8	569,772	31	25,837	3,906	73,452
ASBESTOS							
1927.....	7	13	35,316,821	2,976	3,761,192	1,046,541	10,621,013
1928.....	7	14	35,705,212	3,170	3,989,644	1,177,715	11,238,360
1929.....	7	8	33,248,957	3,391	4,410,535	1,335,610	13,172,581
1930.....	7	8	35,097,872	2,770	3,474,215	1,133,737	8,390,163
1931.....	7	8	40,164,005	1,675	1,836,115	849,047	4,812,886
FELDSPAR AND QUARTZ							
1927.....	48	49	1,286,194	501	423,108	44,655	755,515
1928.....	37	39	1,396,485	481	367,332	48,846	808,875
1929.....	38	40	1,223,675	488	353,891	41,462	901,998
1930.....	51	52	870,488	429	257,388	35,645	686,596
1931.....	33	36	1,342,668	166	135,809	20,996	490,119
GYPSUM							
1927.....	19	23	9,055,624	1,427	1,311,688	198,199	3,251,015
1928.....	16	22	8,035,319	1,159	1,171,814	242,260	3,743,648
1929.....	17	22	7,438,605	987	1,054,213	281,019	3,345,696
1930.....	16	18	8,796,865	822	781,639	201,409	2,818,788
1931.....	17	19	7,941,082	676	656,590	188,524	2,111,517
IRON OXIDES (OCHRE)							
1927.....	5	5	153,317	48	38,680	18,222	103,536
1928.....	5	5	154,251	45	38,834	18,666	111,198
1929.....	4	4	159,523	48	47,324	13,564	115,932
1930.....	4	4	150,704	43	41,238	13,929	83,873
1931.....	4	4	181,535	30	29,194	8,560	49,205
MICA							
1927.....	21	21	322,389	168	118,505	4,400	174,377
1928.....	16	16	260,074	94	42,159	1,966	87,168
1929.....	14	14	281,295	83	47,562	355	118,549
1930.....	13	13	441,744	244	63,316	1,102	96,004
1931.....	11	11	276,356	28	22,556	444	54,066
SALT							
1927.....	10	11	3,194,802	376	499,967	287,260	1,614,667
1928.....	9	10	4,422,922	455	539,775	252,468	1,495,971
1929.....	8	8	4,576,543	424	516,453	249,664	1,578,086
1930.....	8	8	4,685,549	381	455,539	197,313	1,694,631
1931.....	7	7	4,196,927	363	446,984	184,001	1,904,149

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1927-1931—Continued

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
<i>OTHER NON-METAL MINING INDUSTRIES—Concluded</i>							
<i>TALC AND SOAPSTONE</i>							
1927.....	8	9	715,439	122	87,721	25,169	236,105
1928.....	5	5	732,608	91	85,161	21,850	19,358
1929.....	5	5	654,635	86	74,300	21,395	229,198
1930.....	6	6	614,384	141	79,472	16,369	186,216
1931.....	5	5	618,590	70	71,787	19,128	157,083
<i>MISCELLANEOUS</i>							
1927.....	32	32	3,315,380	304	313,338	85,302	670,950
1928.....	33	33	4,478,481	394	414,650	128,029	1,002,399
1929.....	38	38	4,042,638	506	545,216	79,463	1,502,574
1930.....	38	38	3,608,896	498	527,183	188,449	1,192,417
1931.....	34	34	5,457,930	275	297,394	205,149	1,247,697
<i>TOTAL OTHER NON-METAL MINING INDUSTRIES</i>							
1927.....	159	172	53,793,776	6,054	6,661,802	1,720,027	17,559,730
1928.....	137	153	55,633,970	6,052	6,745,927	1,904,798	18,826,692
1929.....	140	148	52,416,662	6,167	7,202,099	2,041,474	21,087,298
1930.....	153	157	54,611,604	5,373	5,722,857	1,792,258	15,228,796
1931.....	126	132	60,748,865	3,314	3,522,266	1,479,755	10,900,174
<i>Total Non-Metal Mining Industries Including Fuels</i>							
1927.....	922	5,633	279,737,591	37,949	48,273,491	5,402,897	85,205,431
1928.....	862	5,416	295,725,531	39,086	54,089,011	5,824,098	89,312,961
1929.....	873	5,494	317,302,496	40,080	55,602,313	6,033,773	93,596,188
1930.....	901	5,191	328,776,596	38,355	47,852,675	5,785,483	80,063,355
1931.....	843	5,374	325,168,359	34,075	36,031,233	4,870,674	61,629,210
<i>Clay Products and Other Structural Materials</i>							
<i>CLAY PRODUCTS</i>							
<i>Brick, Tile and Sewer Pipe</i>							
1927.....	177	186	30,050,885	4,597	4,598,746	2,072,561	10,848,633
1928.....	170	179	32,071,948	5,024	4,999,575	2,278,421	12,013,006
1929.....	181	191	33,493,902	8,366	5,541,452	2,902,869	13,568,646
1930.....	186	198	32,757,926	4,870	4,807,380	1,910,899	10,296,960
1931.....	171	185	33,159,664	3,131	3,428,142	1,476,870	7,585,310
<i>STONEWARE AND POTTERY</i>							
1927.....	5	5	359,918	152	50,965	12,956	311,085
1928.....	4	4	401,255	161	175,087	15,929	359,562
1929.....	4	4	696,154	155	177,620	17,515	326,408
1930.....	5	5	672,851	156	153,750	11,707	296,618
1931.....	4	4	659,500	128	113,108	9,568	255,978
<i>TOTAL CLAY PRODUCTS*</i>							
1927.....	185	194	30,437,607	4,746	4,769,307	2,088,724	11,173,189
1928.....	177	186	32,473,203	5,195	5,181,398	2,294,350	12,381,748
1929.....	186	196	34,190,056	5,530	5,727,014	2,980,384	13,904,643
1930.....	191	203	33,430,777	5,026	4,961,130	1,922,606	10,593,578
1931.....	175	189	33,819,164	3,259	3,541,260	1,486,438	7,841,288

*Includes kaolin and other clays.

Table 18.—Principal Statistics of the Mineral Industry in Canada by Industries, 1927-1931—Concluded

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
<i>OTHER STRUCTURAL MATERIALS</i>							
<i>CEMENT</i>							
1927.....	6	12	40,509,319	2,270	3,143,932	3,546,000	14,391,937
1928.....	5	11	47,678,841	2,407	3,405,385	3,872,108	16,739,163
1929.....	8	11	50,881,818	2,546	3,523,595	4,347,219	19,337,235
1930.....	8	11	59,210,737	2,317	3,172,198	4,120,367	17,713,067
1931.....	9	12	57,378,436	1,820	2,432,950	3,280,870	15,826,243
<i>LIME</i>							
1927.....	53	60	6,200,481	1,132	1,133,708	826,436	3,923,388
1928.....	46	54	6,952,079	1,218	1,516,115	912,395	4,534,568
1929.....	46	53	7,404,677	1,382	1,393,092	1,183,313	5,908,610
1930.....	44	50	8,816,879	1,086	1,087,778	886,354	4,038,698
1931.....	54	60	7,289,990	799	785,868	612,278	2,764,415
<i>SAND AND GRAVEL</i>							
1927.....	483	2,503	7,668,812	7,133	2,043,962	188,327	6,055,601
1928.....	493	2,553	7,783,135	7,831	2,468,468	193,391	5,809,431
1929.....	541	2,598	9,154,055	8,758	2,505,225	285,491	7,317,814
1930.....	724	2,993	7,550,217	5,601	2,508,037	331,010	8,344,913
1931.....	704	3,287	8,635,241	3,224	2,878,011	292,892	6,651,165
<i>STONE</i>							
1927.....	222	258	13,810,984	5,071	4,571,605	496,503	9,265,304
1928.....	254	268	16,027,547	5,129	4,806,514	579,086	10,272,301
1929.....	247	268	20,589,758	5,681	5,459,761	759,418	12,066,532
1930.....	285	305	22,196,388	6,192	5,542,211	697,060	13,037,209
1931.....	300	329	18,860,796	4,198	4,470,699	625,673	11,075,184
<i>TOTAL OTHER STRUCTURAL MATERIALS</i>							
1927.....	764	2,833	68,189,596	15,606	10,893,207	5,057,266	33,636,230
1928.....	798	2,886	78,441,602	16,585	11,996,482	5,556,980	37,355,463
1929.....	842	2,930	88,030,308	18,367	12,881,673	6,575,441	44,630,191
1930.....	1,061	3,359	97,774,221	15,196	12,310,224	6,034,791	43,133,887
1931.....	1,067	3,688	92,164,463	10,041	10,567,528	4,811,713	36,317,007
<i>Total Clay Products and Other Structural Materials</i>							
1927.....	949	3,027	98,627,203	20,382	15,662,514	7,145,990	44,809,419
1928.....	975	3,072	110,914,805	21,780	17,177,880	7,851,339	49,737,181
1929.....	1,028	3,126	122,220,364	23,897	18,608,687	9,495,825	58,534,834
1930.....	1,252	3,562	131,204,998	20,222	17,271,354	7,957,397	53,727,465
1931.....	1,242	3,877	125,983,627	13,300	14,108,778	6,298,151	41,153,295
<i>GRAND TOTAL OF ALL INDUSTRIES</i>							
1927.....	2,350	9,177	714,073,000	84,674	104,220,892	22,960,284	251,077,661
1928.....	2,345	9,036	841,967,982	89,448	115,954,022	23,432,001	279,820,914
1929.....	2,386	9,148	867,021,033	95,102	124,490,511	26,751,585	315,181,388
1930.....	2,478	9,105	887,420,859	89,200	113,975,332	25,066,193	270,806,712
1931.....	2,397	9,578	842,060,023	72,809	91,969,299	21,509,348	238,170,019

Table 19.—Principal Statistics of the Mineral Industry in Canada by Provinces, 1927-1931

Year	Number of active operators	Number of operating plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
NOVA SCOTIA*							
1927.....	78	107	70,934,465	15,663	18,076,122	2,283,744	27,966,861
1928.....	76	104	67,329,525	15,497	21,249,053	2,391,558	28,410,600
1929.....	70	98	67,356,948	14,738	21,035,230	2,436,137	28,529,875
1930.....	74	125	65,893,756	15,484	19,284,197	2,410,115	25,043,071
1931.....	69	244	63,853,580	14,871	15,302,444	2,020,666	19,258,296
NEW BRUNSWICK							
1927.....	41	79	3,014,614	1,196	1,092,891	125,847	2,106,635
1928.....	42	97	3,331,338	1,244	1,107,462	147,154	2,153,943
1929.....	36	93	4,945,074	1,361	1,236,726	168,830	2,407,456
1930.....	49	113	5,349,073	1,391	1,132,306	162,591	2,350,372
1931.....	52	116	5,543,570	1,197	1,048,860	163,893	2,137,832
QUEBEC							
1927.....	381	2,428	110,769,954	18,012	15,104,472	4,988,922	39,617,797
1928.....	402	2,418	133,350,529	17,934	15,921,744	5,953,108	48,631,311
1929.....	412	2,426	146,332,805	19,678	16,886,275	6,703,881	57,313,685
1930.....	387	2,416	140,286,034	15,397	15,190,714	5,885,600	51,673,630
1931.....	452	2,723	146,067,130	11,141	12,666,586	5,607,812	44,064,907
ONTARIO							
1927.....	1,014	5,592	282,205,248	21,147	28,753,161	8,642,617	88,824,642
1928.....	1,022	5,390	325,844,956	23,508	31,912,123	8,343,144	99,003,578
1929.....	1,012	5,417	302,937,672	24,924	34,897,624	9,766,197	116,174,844
1930.....	1,123	5,267	326,396,783	24,706	34,433,915	9,022,652	105,454,625
1931.....	1,014	5,409	305,883,585	20,277	30,470,475	7,508,844	98,509,571
MANITOBA							
1927.....	32	33	11,780,120	1,007	1,232,805	590,225	2,888,895
1928.....	40	41	15,755,174	1,625	1,926,264	631,430	4,183,342
1929.....	43	51	18,020,285	1,819	2,375,990	992,386	5,423,628
1930.....	50	135	35,812,839	3,021	4,372,044	1,205,288	5,665,008
1931.....	51	107	39,113,921	2,059	3,096,332	796,076	15,122,432
SASKATCHEWAN							
1927.....	72	72	5,089,410	1,112	855,704	110,961	1,432,739
1928.....	77	124	5,647,417	1,229	942,150	140,577	1,686,136
1929.....	72	126	6,097,476	1,421	1,139,373	173,677	2,211,708
1930.....	73	144	6,424,080	1,371	1,040,790	229,760	2,333,280
1931.....	76	111	7,136,859	1,092	896,131	222,526	1,876,284
ALBERTA							
1927.....	376	461	105,203,514	11,205	15,699,304	1,154,548	28,621,537
1928.....	362	490	118,556,978	12,358	18,022,037	1,386,358	31,569,442
1929.....	396	558	142,942,397	13,824	19,915,537	1,476,468	33,883,239
1930.....	418	562	149,974,382	12,675	16,272,916	1,407,136	29,933,896
1931.....	401	553	141,629,189	10,579	11,357,722	1,198,890	23,021,495
BRITISH COLUMBIA							
1927.....	282	329	114,129,277	15,031	22,714,957	4,966,446	58,019,829
1928.....	271	319	159,445,533	15,720	24,064,962	4,312,507	61,847,246
1929.....	321	355	170,575,223	16,882	26,073,143	4,943,945	66,256,597
1930.....	281	319	150,279,895	14,836	21,412,925	4,652,217	45,768,150
1931.....	276	309	127,009,722	11,297	16,345,887	3,874,529	31,925,780
YUKON							
1927.....	74	76	10,946,398	301	691,476	96,974	1,598,726
1928.....	53	53	12,706,532	333	808,227	126,165	2,335,316
1929.....	24	24	7,813,153	455	930,613	90,064	2,980,356
1930.....	23	24	7,534,017	319	835,525	90,834	2,583,481
1931.....	6	6	5,822,464	296	784,862	116,112	2,253,422
CANADA							
1927.....	2,350	9,177	714,073,000	84,674	104,220,892	22,960,284	251,077,661
1928.....	2,345	9,036	841,967,982	89,448	115,954,022	23,432,001	279,820,911
1929.....	2,366	9,148	867,021,033	95,102	124,490,511	26,751,585	315,181,388
1930.....	2,478	9,105	887,420,859	89,200	113,975,332	25,066,193	270,785,513
1931.....	2,397	9,578	842,060,020	72,809	91,969,299	21,509,348	238,170,019

*Includes a small production from Prince Edward Island during 1927 and 1928.

Table 20.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1930					\$	\$	\$
Nova Scotia.....	530	77	14,877	15,484	1,144,007	18,140,190	19,284,197
New Brunswick.....	75	18	1,298	1,391	177,399	954,907	1,132,306
Quebec.....	745	87	14,565	15,397	1,789,551	13,401,163	15,190,714
Ontario.....	1,620	228	22,858	24,706	4,463,572	29,970,343	34,433,915
Manitoba.....	106	10	2,905	3,021	317,502	4,054,542	4,372,044
Saskatchewan.....	87	11	1,273	1,371	176,361	864,429	1,040,790
Alberta.....	879	108	11,688	12,675	2,161,571	14,111,345	16,272,916
British Columbia.....	1,084	123	13,629	14,836	2,834,951	18,577,974	21,412,925
Yukon.....	16	1	302	319	63,147	772,378	835,525
Canada.....	5,142	663	83,395	89,200	13,123,061	100,847,271	113,975,332
1931							
Nova Scotia.....	493	73	14,305	14,871	1,122,790	14,179,654	15,302,444
New Brunswick.....	65	17	1,115	1,197	161,660	887,200	1,048,860
Quebec.....	815	96	10,230	11,141	1,830,797	10,835,789	12,666,586
Ontario.....	1,580	223	18,474	20,277	4,324,136	26,149,339	30,470,475
Manitoba.....	166	16	1,877	2,059	510,118	2,580,214	3,096,332
Saskatchewan.....	71	12	1,009	1,092	162,181	739,950	896,131
Alberta.....	777	95	9,707	10,579	1,892,734	9,484,988	11,357,722
British Columbia.....	920	102	10,275	11,297	2,357,133	13,988,754	16,345,887
Yukon.....	23	1	272	296	86,489	698,373	784,862
Canada.....	4,910	635	67,264	72,809	12,448,038	79,521,261	91,969,299

*Note on the Method of Computing the Average Number of Wage-earners for Each Industry for 1930.—If a company works only 3 months in the year, the average number of wage-earners for this company is obtained by adding the monthly figures and dividing by 3. If a second company operates every month in the year, the average number of wage-earners for this company is obtained by adding the monthly figures and dividing by 12. The average number of wage-earners for each other company in the industry is computed in the same way. The average number of wage-earners in the industry during the year is the sum of these individual averages. For 1931—the average number of wage-earners was obtained by adding the monthly figures for individual companies and dividing by 12 irrespective of the number of months worked, the average number of wage-earners in the industry, as in the previous year, is the sum of these individual averages.

Table 21.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1930 and 1931

Industry and Year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1930					\$	\$	\$
METAL MINING							
Alluvial Gold Mines.....	25	5	364	394	76,260	536,109	612,369
Auriferous Quartz Mines.....	443	23	7,935	8,401	1,544,258	12,490,362	14,034,620
Copper-Gold-Silver Mines.....	269	16	5,409	5,694	724,275	8,432,484	9,156,759
Silver-Cobalt Mines.....	74	3	966	1,043	218,553	1,270,038	1,488,591
Silver-Lead-Zinc Mines.....	220	18	2,628	2,866	579,089	3,684,872	4,263,961
Nickel-Copper Mines.....	12	1	3,440	3,483	178,211	5,210,572	5,388,783
Miscellaneous Metal Mines.....	.....	.....	104	116	21,771	88,325	110,096
Non-Ferrous Smelting and Refining.....	690	98	7,838	8,626	2,009,895	11,786,229	13,796,124
NON-METAL MINING INCLUDING FUELS							
Fuels							
Coal.....	1,335	133	27,704	29,172	3,185,183	33,257,178	36,442,361
Natural Gas.....	513	137	1,291	1,941	974,888	1,374,815	2,349,703
Petroleum.....	202	43	1,624	1,869	459,412	2,878,342	3,337,754
Other Non-Metal Mining							
Abrasive—natural.....	8	3	34	45	18,090	24,777	42,867
Asbestos.....	195	35	2,540	2,770	475,167	2,999,048	3,474,215
Feldspar.....	12	2	237	251	23,550	90,233	113,783
Gypsum.....	56	13	753	822	152,158	629,481	781,639
Iron Oxides.....	2	.....	41	43	4,543	36,695	41,238
Mica.....	3	1	240	244	6,938	56,378	63,316
Quartz.....	12	.....	166	178	21,951	121,654	143,605
Salt.....	42	10	329	381	107,637	347,902	455,539
Talc and Soapstone.....	3	2	136	141	10,610	68,862	79,472
Miscellaneous.....	48	9	441	498	84,598	442,585	527,183
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	116	10	2,191	2,317	267,003	2,905,195	3,172,198
Clay Products.....	345	54	4,627	5,026	922,499	4,038,631	4,961,130
Lime.....	80	11	995	1,066	148,525	939,253	1,087,778
Sand and Gravel.....	91	9	5,501	5,601	195,634	2,312,403	2,508,037
Stone.....	304	27	5,861	6,192	717,363	4,824,848	5,542,211
Total.....	5,142	663	83,395	89,200	13,123,061	100,847,271	113,975,332

*See note above.

Table 21.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1930-1931—Concluded

Industry and Year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1931							
METAL MINING							
Alluvial Gold Mines.....	25	2	310	337	78,285	604,650	682,935
Auriferous Quartz Mines.....	524	29	9,083	9,636	1,711,496	14,755,669	16,467,165
Copper-gold-silver Mines.....	211	15	3,125	3,351	561,223	4,397,094	4,958,317
Silver-Cobalt Mines.....	52	2	732	786	147,195	1,002,494	1,149,689
Silver-Lead-Zinc Mines.....	146	11	1,142	1,299	377,740	1,772,181	2,149,921
Nickel-Copper Mines.....	41	.....	2,092	2,133	170,155	2,980,085	3,150,240
Miscellaneous Metal Mines.....	3	.....	29	32	5,954	19,740	25,694
Non-Ferrous Smelting and Refining.....	775	103	6,982	7,860	2,131,079	11,114,248	13,245,327
NON-METAL MINING INCLUDING FUELS							
Fuels							
Coal.....	1,242	129	26,489	27,860	2,960,546	25,841,882	28,802,428
Natural Gas.....	460	136	1,096	1,692	915,409	1,156,613	2,072,022
Petroleum.....	138	28	1,043	1,209	368,320	1,266,197	1,634,517
Other Non-Metal Mining							
Abrasives—natural.....	6	3	22	31	11,856	13,981	25,837
Asbestos.....	138	34	1,503	1,675	405,060	1,431,055	1,836,115
Feldspar and Quartz.....	23	2	141	166	31,462	104,347	135,809
Gypsum.....	52	12	612	676	131,887	524,703	656,590
Iron oxides.....	2	.....	28	30	3,800	25,394	29,194
Mica.....	2	1	25	28	5,770	16,786	22,556
Salt.....	41	16	306	363	112,479	334,505	446,984
Talc and Soapstone.....	5	2	63	70	23,275	48,512	71,787
Miscellaneous.....	37	4	234	275	68,947	228,447	297,394
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	110	11	1,699	1,820	268,434	2,164,516	2,432,950
Clay Products.....	390	45	2,824	3,259	918,781	2,622,469	3,541,250
Lime.....	67	11	721	799	121,525	664,343	785,868
Sand and Gravel.....	118	12	3,094	3,224	257,481	2,620,530	2,878,011
Stone.....	302	27	3,869	4,198	659,879	3,810,820	4,470,699
Total.....	4,910	635	67,264	72,809	12,448,938	79,521,261	91,969,299

*See note, page 35.

Table 22.—Wage-Earners Working in Month of Greatest Employment, Classified According to the Number of Hours Worked per Day, for the Mineral Industry in Canada, by Provinces and by Industries, 1930.

Province and Industry	Number of wage-earners working			
	8 hours or less per day	9 hours	10 hours	Over 10 hours
1930				
By Provinces—				
Nova Scotia.....	15,556	876	980	52
New Brunswick.....	329	677	425	29
Quebec.....	3,996	2,657	9,574	1,123
Ontario.....	15,264	4,899	4,682	668
Manitoba.....	2,151	198	970	263
Saskatchewan.....	172	103	896	68
Alberta.....	13,443	522	540	109
British Columbia.....	15,588	101	48	17
Yukon.....	241	.....	210	.....
Canada.....	66,740	10,933	18,325	2,329
By Industries—				
METAL MINING—				
Alluvial Gold Mines.....	142	46	306	4
Auriferous Quartz Mines.....	7,324	975	168	36
Copper-Gold-Silver Mines.....	5,705	736	65	79
Silver-Cobalt Mines.....	646	279	19	9
Silver-Lead-Zinc Mines.....	3,010	215	98	7
Nickel-Copper Mines.....	3,609	645	36	7
Miscellaneous Metal Mines.....	76	48	.....	.....
Non-Ferrous Smelting and Refining.....	6,627	1,416	447	79
NON-METAL MINING INCLUDING FUELS—				
Fuels—				
Coal.....	31,933	896	931	29
Natural Gas.....	700	799	25	16
Petroleum.....	1,732	15	85	8

Table 22.—Wage-Earners Working in Month of Greatest Employment, Classified According to the Number of Hours Worked per Day, for the Mineral Industry in Canada, by Provinces and by Industries, 1930—Concluded.

Province and Industry	Number of wage-earners working			
	8 hours or less per day	9 hours	10 hours	Over 10 hours
NON-METAL MINING INCLUDING FUELS—Con.				
<i>Other Non-Metal Mining—</i>				
Abrasives.....	8		49	
Asbestos.....	765	52	2,654	405
Feldspar.....	3	149	110	
Gypsum.....	75	270	674	52
Iron Oxides.....			49	14
Mica.....	194	83	48	
Quartz.....		83	123	8
Salt.....	66	134	107	72
Talc and Soapstone.....		12	123	
Miscellaneous.....	90	32	261	191
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—				
Cement.....	1,276	246	563	457
Clay Products.....	1,171	1,384	2,605	413
Lime.....	297	252	446	232
Sand and Gravel.....	263	138	3,247	48
Stone.....	1,028	1,153	5,095	163
Total	66,740	10,033	18,325	2,329

Table 23.—Number of Wage-Earners in Canadian Mining Industries in Month of Highest Employment During 1931 whose Regular (Normal) Hours, per Week, were:

(Does not include overtime)

	40 hours or less	41-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-53 hours	54 hours	55 hours	56-59 hours	60 hours	Over 60 hours
By Provinces—												
Nova Scotia.....	571		12	4	14,409		362	479	29	185	1,189	20
New Brunswick.....	44		3	16	227	51	48	746		22	95	71
Quebec.....	257	1,050	506	220	1,973	362	209	1,116	1,103	599	6,833	983
Ontario.....	403	40	208	105	10,202	408	346	2,945	331	4,064	1,990	1,207
Manitoba.....	28	3	76	4	73	3	101	57	239	1,469	217	235
Saskatchewan.....	17			11	333	28		351	2	93	967	57
Alberta.....	615	5	47	187	10,336	54	20	103	26	1,525	469	40
British Columbia.....	1,176	6	127	16	7,752	25	48	30	143	2,745	60	38
Yukon.....					12					160		239
Canada	3,111	1,104	979	563	45,317	931	1,134	5,827	1,873	10,862	11,820	2,890
By Industries—												
METAL MINING—												
Alluvial Gold Mines.....	21				135			14	2	132	30	266
Auriferous Quartz Mines.....	7			1	6,639	20	324	1,028		1,504	47	486
Copper-Gold-Silver Mines.....	2		6		1,687	23	40		441	1,293	124	104
Silver-Cobalt Mines.....					796		89	51		22		11
Silver-Lead-Zinc Mines.....	903		1		237		7			253	5	15
Nickel-Copper Mines.....					1,933			375		123	15	5
Miscellaneous Metal Mines.....					54			18				
Non-Ferrous Smelting and Refining.....	77	172	233	11	2,032	150	19	587	77	4,036	172	304
NON-METAL MINING INCLUDING FUELS—												
<i>Fuels—</i>												
Coal.....	1,016	2	46	55	29,024	44	362	908	4	100	379	29
Natural Gas.....	70			107	159		45	637		14	86	27
Petroleum.....	30	2			184	17		4	21	1,336	29	10
<i>Other Non-metal Mining—</i>												
Abrasives.....	4					1		4			35	
Asbestos.....		763									1,383	10
Feldspar and Quartz.....		1	2		21	12	7	128	7	9	114	5
Gypsum.....	127	4	14	32	25	6	8	257	3	148	342	142
Iron Oxides.....							31				17	
Mica.....						8		18	19			
Salt.....	5		30	4	112	4	1	1	1	12	100	99
Talc and Soapstone.....							5				66	3
Miscellaneous.....	4		3		47			38	34	15	160	168
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—												
Cement.....		7	50	72	586	3	25	206	39	630	263	235
Clay Products.....	360	20	243	75	453	353	32	439	720	218	1,009	484
Lime.....	61	29	78	20	299	1	2	72	33	70	355	76
Sand and Gravel.....	41	19	26	10	164	31	48	31	35	563	5,009	63
Stone.....	383	85	247	176	730	258	89	1,011	437	384	2,080	348
Total	3,111	1,104	979	563	45,317	931	1,134	5,827	1,873	10,862	11,820	2,890

Table 24.—Fuel and Electricity Used in the Minera

Industry	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
METAL MINING						
Alluvial Gold Mines.....Quantity	80	41		169		
	\$ 670	410		723		
Auriferous Quartz Mines.....Quantity	431	17,876	470			142
	\$ 5,569	172,189	7,819			2,512
Copper-Gold-Silver Mines.....Quantity	7,975	2,733	42	131		211
	\$ 70,552	24,601	685	1,183		3,188
Silver-Cobalt Mines.....Quantity		5,184	842			
	\$	58,574	12,823			
Silver-Lead-Zinc Mines.....Quantity	31,484	1,170		80		171
	\$ 156,428	9,335		720		1,286
Nickel-Copper Mines.....Quantity		6,935	38			270
	\$	40,160	653			2,526
Miscellaneous Metal Mines.....Quantity	400					
	\$ 2,800					
Non-Ferrous Smelting and Refining.....Quantity	71,165	194,039	2,913			*11,476
	\$ 419,719	1,009,947	30,721			117,449
Total.....Quantity	111,535	227,978	4,305	380		12,270
	\$ 655,738	1,315,216	52,701	2,626		126,961
NON-METAL MINING, INCLUDING FUELS						
<i>Fuels</i>						
Coal.....Quantity	745,554			134,959		
	\$ 2,546,797			122,485		
Natural Gas.....Quantity						
	\$					
Petroleum.....Quantity	11,968			666		2
	\$ 75,149			4,210		26
Total.....Quantity	757,522			135,625		2
	\$ 2,621,946			126,695		26
<i>Other Non-Metal Mining</i>						
Asbestos.....Quantity	34,084	6,665	14,195			1,080
	\$ 229,607	51,478	95,666			12,632
Feldspar.....Quantity	101	475				1
	\$ 736	3,875				17
Gypsum.....Quantity	6,717	3,976				1,177
	\$ 48,007	26,326				10,812
Iron Oxides.....Quantity	149	52	16			
	\$ 1,084	406	240			
Mica.....Quantity		125	5			
	\$	913	71			
Quartz.....Quantity	63	2,185		459		
	\$ 411	12,019		2,983		
Salt.....Quantity	2,500	42,426				
	\$ 11,320	171,926				
Talc and Soapstone.....Quantity		230	46			
	\$	1,470	600			
Miscellaneous.....Quantity	8,406	606	21	10,139		
	\$ 44,442	2,828	325	33,663		
Natural Abrasives.....Quantity	499			62		
	\$ 3,183			310		
Total.....Quantity	52,519	56,740	14,283	10,660		2,258
	\$ 338,790	271,241	96,902	36,956		23,461
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement.....Quantity	309,262	299,459	889			94
	\$ 1,608,969	1,694,382	3,245			879
Clay Products.....Quantity	39,454	171,455	3,722	9,666	874	3,228
	\$ 227,383	1,039,101	26,248	23,681	5,303	26,548
Lime.....Quantity	32,263	58,524	5,120			10,920
	\$ 204,296	273,273	24,428			72,694
Sand and Gravel.....Quantity	1,323	28,204	7,763			4
	\$ 10,863	169,654	53,040			45
Stone.....Quantity	7,180	22,870	1,086	355		90
	\$ 48,061	151,626	6,148	2,639		925
Total.....Quantity	389,482	580,512	18,580	10,021	874	14,336
	\$ 2,099,572	3,328,036	113,109	26,320	5,303	101,091
Canada.....Quantity	1,311,058	865,230	37,168	156,686	874	28,866
	\$ 5,716,046	4,914,493	262,712	192,597	5,303	251,539

* Coke used for fuel only. Coke used in smelting amounted to 371,093 tons, valued at \$3,262,541.

Industry in Canada, by Kinds and by Industries, 1930

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
10,025	1,449		450						11,696,500	2,834,200
3,345	544		2,580					8,272		28,342
30,708	4,016	1,700,621	11,640	13			213,116,298		8,493,201	61,648
11,304	1,162	170,614	64,518	278		869	1,927,268	2,364,102		1,233
182,335	9,334	977,664	4,269	17			125,127,010		35,166,627	
50,939	2,580	79,283	18,540	54		21,896	998,761	1,272,262		
2,149	500	78,074	1,143				17,487,933			
670	125	10,338	7,080			38,181	225,053	352,844		
65,220	886	829,154	2,199				49,482,317		22,915,897	
26,703	234	144,202	19,795				295,982	654,655		
1,416	1,808	91,931					60,523,328			
368	423	9,651					146,370	200,151		
1,364			400							
300			2,000					5,100		
66,129	5,722	11,375,423	13,261	219,231	324		1,286,754,023		230,985,901	24,740,300
16,069	1,329	809,721	90,675	21,923	254	6,200	3,941,890	6,465,897		143,503
359,346	23,715	15,052,867	33,362	219,261	324		1,752,490,909		309,258,126	27,636,148
109,698	6,397	1,223,809	205,188	22,255	254	67,146	7,535,324	11,323,313		173,078
28,097			1,474				74,054,109		94,972,298	16,069,530
8,525			7,261				910,348	3,595,416		200,171
12,867	171				71,046		6,054			
3,448	51				30,216		96	33,811		
30,033	250	755,571	796		4,079,801		2,061,195		5,015	
8,144	72	55,019	3,870		195,751		21,757	363,998		
70,997	421	755,571	2,270		4,150,907		76,121,958		04,977,313	16,069,530
20,117	123	55,019	11,131		225,967		932,201	3,993,225		200,171
54,393	5,360	3,195					68,657,357			
9,550	1,152	272					733,380	1,133,737		
14,365	675	898	62							
3,392	145	142	250					8,575		
101,897	1,060	157,981	3		8,010	18	4,365,313			
23,896	229	10,435	30		3,694		77,980	201,409		
	200	800	1,046				209,647			
	26	100	7,880				4,193	13,929		
80			3				7,900			
22			17				79	1,102		
7,106	622		25				364,500		285,448	
1,600	144		65				9,848	27,070		
		63,737					732,256		74,020	
		5,408					8,659	197,313		
							1,429,937			
							14,299	16,369		
58,140	1,179	895,572	1,763	23,325			1,164,807		101,760	
12,140	313	76,056	6,089	1,866			10,727	188,449		
440			53				10,048			
110			200				502	4,305		
236,421	9,096	1,122,183	2,955	23,325	8,010		76,941,765		461,228	
50,710	2,009	92,413	14,531	1,866	3,694	18	859,667	1,792,258		
22,093	2,503	29,350					190,209,859		16,621,080	
5,558	502	3,816					803,016	4,120,367		
56,830	1,740	236,109	53,259		520,376		18,202,764		53,590	
12,946	513	28,407	243,760		20,628		268,088	1,922,606		
3,328	230	554,995	49,170	201,350	13,426		8,508,929		115,900	
753	55	18,189	201,820	16,108	8,056	6,417	60,265	886,354		
85,049	565	8,802					6,422,128			
21,719	139	896					74,654	331,010		
185,656	2,492	342,902	3,112				22,184,307		1,300,657	
43,908	594	30,145	16,889				396,125	697,060		
352,956	7,530	1,172,158	105,541	201,350	533,802		245,527,987		18,091,227	
84,884	1,803	81,453	462,469	16,108	28,684	6,417	1,602,148	7,957,397		
1,019,720	40,762	18,102,779	144,128	443,936	4,693,043	2,511	2,151,082,619		422,787,894	43,705,678
265,409	10,332	1,452,694	693,319	40,229	258,599	73,581	10,929,340	25,066,193		373,249

Table 25.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthracite coal	Lignite coal		Coke
	Canadian	Imported		Canadian	Imported	
	Tons	Tons	Tons	Tons	Tons	
METAL MINING						
Alluvial Gold Mines.....	Quantity 90	1				
	\$ 811	260				
Auriferous Quartz Mines.....	Quantity 382	20,261	250			119
	\$ 5,463	179,470	4,518			1,796
Copper-Gold-Silver Mines.....	Quantity 3,789	644	47	18		49
	\$ 33,263	4,840	845	160		547
Silver-Cobalt Mines.....	Quantity 25	3,100	154			64
	\$ 25,294	34,328	2,438			
Silver-Lead-Zinc Mines.....	Quantity 118,369	345				640
	\$ 118,369	2,242				10
Nickel-Copper Mines.....	Quantity 12,558	2,071	70			115
	\$ 12,558	1,175				
Miscellaneous Metal Mines.....	Quantity					
†Non-Ferrous Smelting and Refining.....	Quantity 89,898	191,684	59	33		*5,105
	\$ 489,927	1,009,717	998	211		48,533
Total.....	Quantity 119,453	218,106	580	51		5,347
	\$ 647,833	1,243,415	9,974	371		51,631
NON-METAL MINING, INCLUDING FUELS						
<i>Fuels</i>						
Coal.....	Quantity 647,461			115,750		
	\$ 2,076,349			109,741		
Natural Gas.....	Quantity 13	189	3			
	\$ 122	1,602	50			
Petroleum.....	Quantity 4,902					
	\$ 21,749					
Total.....	Quantity 652,376	189	3	115,750		
	\$ 2,098,220	1,602	50	109,741		
<i>Other Non-Metal Mining</i>						
Asbestos.....	Quantity 23,644	337	5,477	1,412		583
	\$ 152,012	2,341	39,638	9,672		5,385
Feldspar and Quartz.....	Quantity 338	706	4			
	\$ 2,271	4,282	68			
Gypsum.....	Quantity 8,874	2,507		450		347
	\$ 50,522	20,524		4,060		3,812
Iron Oxides.....	Quantity 81		16			
	\$ 587		256			
Mica.....	Quantity 46					
	\$ 301					
Salt.....	Quantity 2,210	41,160				
	\$ 10,668	163,430				
Talc and Soapstone.....	Quantity 20		250			
	\$ 250		2			
Miscellaneous.....	Quantity 5,614	931	2	10,445		
	\$ 32,807	4,512	31	34,152		
Natural Abrasives.....	Quantity 287			54		10
	\$ 2,101			271		140
Total.....	Quantity 41,048	45,687	5,519	12,361		940
	\$ 250,968	195,390	40,243	48,155		9,337
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement.....	Quantity 288,851	194,067	1,096			63
	\$ 1,569,214	958,076	4,000			589
Clay Products.....	Quantity 31,045	131,888	2,404	2,505	47	1,549
	\$ 198,383	815,923	20,335	10,486	300	12,713
Lime.....	Quantity 3,799	46,545	456			7,640
	\$ 24,121	267,376	2,209			50,343
Sand and Gravel.....	Quantity 1,347	23,591	42			6
	\$ 10,786	133,836	546			57
Stone.....	Quantity 5,323	10,780	637	94		39
	\$ 37,152	72,822	3,927	518		414
Total.....	Quantity 330,365	406,871	4,631	2,599	47	9,297
	\$ 1,839,656	2,248,033	31,017	11,004	300	64,116
Canada.....	Quantity 1,143,242	670,853	10,733	130,761	47	15,584
	\$ 4,836,677	3,688,440	81,234	169,271	300	125,084

* Coke used for fuel only. Coke used in smelting amounted to 176,356 tons valued at \$1,565,927.

† Coal used for furnace charges totalled 132,133 tons valued at \$1,069,923.

Industry in Canada, by Kinds and by Industries, 1931

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.
11,416	1,244	980	3,861						11,387,391
5,684	383	148	34,459					41,745	
46,781	6,981	2,019,405	14,501				253,436,606		10,299,099
14,067	1,859	208,575	61,428			280	2,222,870	2,700,326	
36,099	1,688	485,107	2,209				225,400,728		33,720,345
7,793	533	25,480	8,049			853	644,139	726,502	
3,844	220	29,509	789				12,637,458		
1,066	50	4,500	4,476			25,384	155,225	227,467	
2,627	331	265,278	526				37,445,935		15,844,853
1,128	225	93,829	12,125				256,548	485,106	
811	1,875	41,817					48,757,862		
210	416	4,472	7				86,457	105,493	
2,210			21					576	
555			7						
85,345	8,381	9,329,424	2,368	204,345	222		1,296,645,979		129,069,946
19,882	1,787	485,434	19,137	25,739	186	7,968	3,943,879	6,053,398	
189,133	20,720	12,171,520	24,261	204,345	222		1,874,324,568		200,321,634
50,385	5,253	822,438	139,695	25,739	186	34,485	7,309,118	10,340,523	
36,860	1,692	632					68,694,160		78,102,033
8,595	364	114					865,324	3,060,487	
17,105		13,275	25		47,991		13,010		
4,405		1,253	62		18,674		753	26,921	
25,211	871	86,005	196		3,528,818		1,221,065		7,000
6,059	198	6,142	1,195		251,328	124	16,716	303,511	
79,176	2,563	99,912	221		3,576,809		69,928,235		78,109,033
19,059	562	7,509	1,257		270,002	124	882,793	3,390,919	
53,329	774	3,787					47,821,190		
8,942	164	432					630,461	849,047	
9,597	530	2,310	255				420,085		
2,060	115	241	1,057			25	10,877	20,996	
146,820	3,610	244,291	4		6,210		3,760,429		
33,419	736	17,275	24		2,567		55,585	188,524	
	100	450	577				249,820		
	20	52	3,898				3,747	8,560	
			7				9,800		125
			45				98	444	
		69,561					454,683		132,803
		5,010					4,893	184,001	
							1,655,827		
							18,878	19,128	
40,306	731	1,382,900	675	8,334			2,145,960		
6,663	172	101,517	2,412	700		13	22,170	205,149	
197			200				5,490		
37			1,000				357	3,906	
250,249	5,745	1,703,299	1,718	8,334	6,210		56,523,284		132,928
51,121	1,207	124,527	8,436	700	2,567	38	747,066	1,479,755	
21,234	2,262	14,176					152,884,534		8,782,108
4,938	420	1,843					741,790	3,280,870	
33,470	1,574	136,226	34,333	95	523,252		17,660,875		315,221
7,306	357	16,023	148,447	40	15,693	67	240,365	1,486,438	
4,496	60	393,592	44,356	128,954	10,800		5,940,170		242,089
1,083	12	14,134	176,225	10,832	6,800	4,180	64,963	612,278	
134,696	1,876	116,285	27				6,204,040		570,912
25,969	417	8,166	73			1,097	111,945	292,892	
228,018	1,207	200,383	4,402				29,798,893		100,811
49,728	242	13,335	19,677			1,084	426,774	625,673	
421,914	6,979	860,662	83,118	129,049	534,652		212,488,512		10,011,141
89,024	1,448	53,501	344,422	10,872	22,493	6,428	1,575,837	6,298,151	
940,472	36,007	14,835,393	109,318	341,728	4,117,293		2,213,264,599		288,574,736
209,559	8,470	1,007,975	493,810	37,311	295,248	41,075	10,514,814	21,509,348	

Table 26.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Canadian	Im-ported		Canadian	Im-ported	
	Tons	Tons	Tons	Tons	Tons	Tons
Nova Scotia.....Quantity	475,556	16				2,826
\$	1,753,470	80				16,900
New Brunswick.....Quantity	15,023			20		
\$	85,882			160		
Quebec.....Quantity	310,293	68,092	20,133	459		9,583
\$	1,765,007	463,506	143,160	2,983		99,174
Ontario.....Quantity	321	737,279	17,015		874	12,356
\$	3,128	3,955,171	119,247		5,303	91,556
Manitoba.....Quantity	6,425	59,741	10	131		556
\$	57,896	493,853	105	1,183		6,958
Saskatchewan.....Quantity	4,955			56,852		
\$	43,506			93,181		
Alberta.....Quantity	188,390			98,640		
\$	654,776			91,168		
British Columbia.....Quantity	310,045	102	10	584		3,545
\$	1,352,231	1,883	200	3,922		36,951
Yukon.....Quantity	50					
\$	150					
Canada.....Quantity	1,311,058	865,230	37,168	156,686	874	28,866
\$	5,716,046	4,914,493	262,712	192,597	5,303	251,539

Table 27.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Canadian	Im-ported		Canadian	Im-ported	
	Tons	Tons	Tons	Tons	Tons	Tons
Nova Scotia.....Quantity	407,956					2,184
\$	1,424,120					13,759
New Brunswick.....Quantity	16,494	4				
\$	85,791	64				
Quebec.....Quantity	244,269	85,501	8,576	1,412		3,102
\$	1,375,719	558,220	59,828	9,672		26,465
Ontario.....Quantity	153	581,177	1,166	40	47	7,530
\$	1,262	3,093,399	12,908	300	300	55,204
Manitoba.....Quantity	34,220	4,170		483		236
\$	256,524	36,497		4,271		2,877
Saskatchewan.....Quantity	1,314		979	43,721		
\$	10,092		8,308	72,575		
Alberta.....Quantity	154,981			84,422		
\$	509,341			78,713		
British Columbia.....Quantity	283,837		12	683		2,532
\$	1,173,774		240	3,740		26,779
Yukon.....Quantity	18	1				
\$	54	260				
Canada.....Quantity	1,143,242	670,853	10,733	130,761	47	15,534
\$	4,836,677	3,688,440	81,284	169,271	300	125,084

* Includes comparatively small quantity used for lighting.

Industry in Canada, by Provinces, 1930

Gasoline	Kerosene	Fuel and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated	
				Manufactured	Natural				For own use	For sale
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.	K.W.H.
98,821	916	164,071	5,713	224,675	.....	.....	43,636,373	.....	64,166,034	12,051,011
23,254	204	21,226	22,121	17,974	.....	.....	554,886	2,410,115	.....	121,772
4,048	471	22,952	13,382	.....	24,991	.....	221,342	.....	600,480	.....
997	141	2,473	52,123	.....	10,448	.....	10,367	162,591	.....	.....
232,875	12,304	548,178	24,368	17	.....	.....	780,665,183	.....	223,750,883	.....
56,094	2,818	68,166	127,691	54	.....	4,557	3,152,390	5,885,600	.....	.....
288,689	15,865	9,467,706	55,209	13	68,433	.....	614,035,869	.....	17,994,157	.....
66,816	3,783	768,131	302,968	278	36,653	42,071	3,627,547	9,022,652	.....	.....
151,469	5,570	188,567	18,035	.....	.....	.....	49,254,487	.....	2,457,000	.....
42,559	1,613	39,507	90,901	.....	.....	.....	470,713	1,205,288	.....	.....
42,316	2,191	866,633	965	.....	.....	.....	120,904	.....	300,000	.....
12,069	632	74,016	3,505	.....	.....	.....	2,851	229,760	.....	.....
51,577	250	755,571	4,314	.....	4,599,619	.....	30,658,113	.....	12,210,426	2,136,398
14,565	72	55,019	19,544	.....	211,498	.....	360,494	1,407,136	.....	40,757
146,709	3,147	5,929,047	21,572	219,231	.....	.....	632,490,348	.....	88,596,733	26,684,069
46,489	999	348,260	62,324	21,923	.....	26,953	2,750,092	4,652,217	.....	182,378
3,216	48	160,054	570	.....	.....	.....	.....	.....	12,712,181	2,834,200
2,566	80	75,896	12,142	.....	.....	.....	.....	90,834	.....	28,342
1,019,720	40,762	18,102,779	144,128	443,936	4,693,043	.....	2,151,082,619	.....	422,787,894	43,705,678
265,409	10,332	1,452,694	693,319	40,229	258,599	73,551	10,929,340	25,066,193	.....	373,249

Industry in Canada, by Provinces, 1931.

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	*Electricity purchased for power only	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.		K.W.H.
104,098	1,183	68,166	1,503	137,288	.....	.....	41,788,293	.....	50,110,160
23,627	247	7,165	6,064	11,532	.....	.....	534,152	2,020,666	.....
20,328	201	127,853	11,677	.....	12,607	.....	513,831	.....	880,480
4,259	53	10,357	44,900	.....	5,126	.....	13,343	163,893	.....
231,540	6,351	2,644,836	27,967	1,483	.....	.....	817,188,219	.....	115,726,936
49,699	1,347	137,065	136,584	1,542	.....	4,633	3,247,035	5,607,812	.....
359,730	16,744	6,118,020	37,117	.....	105,630	.....	583,611,005	.....	14,573,404
74,625	3,732	378,538	170,736	.....	26,700	31,375	3,659,765	7,508,844	.....
63,219	2,605	71,695	10,640	95	.....	.....	173,423,109	.....	.....
14,769	534	12,667	44,509	40	.....	977	422,411	796,076	.....
46,230	1,287	1,389,411	469	.....	.....	.....	1,207,500	.....	695,221
8,695	300	102,322	1,456	.....	.....	.....	18,778	222,526	.....
54,521	3,173	86,637	735	.....	3,999,056	.....	30,016,091	.....	11,205,592
14,500	708	6,256	3,451	.....	263,422	.....	322,499	1,198,890	.....
60,184	4,211	4,172,469	17,642	202,862	.....	.....	565,516,551	.....	82,899,674
18,900	1,265	269,898	54,818	24,197	.....	4,090	2,296,828	3,874,529	.....
622	252	156,306	1,568	.....	.....	.....	.....	.....	12,483,269
515	284	83,707	31,292	.....	.....	.....	.....	116,112	.....
940,472	36,007	14,835,393	109,318	341,728	4,117,293	.....	2,213,264,599	.....	288,574,736
209,589	8,470	1,007,975	493,810	37,311	295,248	41,075	10,514,814	21,509,348	.....

Table 28.—Power Employed in the Mineral Industry in Canada, by Provinces, 1931, with Comparative Totals for 1930

Province	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
Nova Scotia.....No.	101	60	2	163	291	454	434	725	137
H.P.	57,239	4,316	195	61,750	11,345	73,095	44,646	55,991	36,474
New Brunswick.....No.	46	34	.....	80	35	115	69	104	41
H.P.	2,682	609	.....	3,291	742	4,033	832	1,574	2,474
Quebec.....No.	71	116	14	201	2,578	2,779	97	2,675	121
H.P.	3,049	5,230	51,740	60,019	107,909	167,928	2,112	110,021	10,277
Ontario.....No.	204	310	11	525	5,653	6,178	664	6,317	214
H.P.	17,558	12,352	5,416	35,326	269,639	304,965	12,245	281,884	26,298
Manitoba.....No.	29	15	.....	44	1,617	1,661	9	1,626	24
H.P.	3,265	450	.....	3,715	56,340	60,055	113	56,453	3,720
Saskatchewan.....No.	47	16	.....	63	78	141	94	172	28
H.P.	3,662	703	.....	4,365	3,354	7,719	1,260	4,614	3,620
Alberta.....No.	235	111	.....	346	882	1,228	398	1,280	265
H.P.	36,408	4,193	.....	40,601	30,995	71,596	11,863	42,868	32,023
British Columbia.....No.	155	90	61	306	2,619	2,925	660	3,279	139
H.P.	38,819	6,240	41,733	86,792	155,757	242,549	28,254	184,011	26,604
Yukon.....No.	11	10	2	23	.....	23	32	32	10
H.P.	254	785	10,000	11,039	.....	11,039	451	451	383
Canada, 1931.....No.	899	762	90	1,751	13,753	15,504	2,457	16,210	979
H.P.	162,936	34,878	109,084	306,898	636,081	942,979	101,776	737,857	141,873
Canada, 1930.....No.	939	695	99	1,733	13,285	15,018	2,507	15,792	1,066
H.P.	165,561	34,728	110,671	310,960	613,462	924,422	109,751	723,213	142,192

Table 29.—Power Employed in the Mineral Industry in Canada by Industries, 1931, with Comparative Totals for 1930

Industry	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
METAL MINING—									
*Alluvial Gold Mines.....No.	18	24	7	49	.....	49	*	*	12
H.P.	514	510	10,036	11,060	.....	11,060	*	*	551
Auriferous Quartz Mines.....No.	19	59	9	87	1,808	1,895	230	2,038	62
H.P.	1,036	9,198	3,154	13,388	85,389	98,777	5,547	90,936	5,919
Copper-Gold-Silver Mines.....No.	11	7	13	31	1,905	1,936	14	1,919	22
H.P.	2,745	494	10,459	13,698	69,102	82,800	1,003	70,105	3,613
Silver-Cobalt Mines.....No.	4	1	.....	5	173	178	.....	173	16
H.P.	250	65	.....	315	4,167	4,482	.....	4,167	800
Silver-Lead-Zinc Mines.....No.	22	33	7	62	301	363	55	356	5
H.P.	7,325	2,790	1,059	11,174	12,639	23,813	1,299	13,938	130
Nickel-Copper Mines.....No.	.....	.....	.....	.....	320	320	.....	320	1
H.P.	.....	.....	.....	.....	27,282	27,282	.....	27,282	60
Miscellaneous Metal Mines.....No.	1	4	.....	5	.....	5	.....	.....	1
H.P.	25	160	.....	185	.....	185	.....	.....	30
Non-Ferrous Smelting and Refining.....No.	29	11	21	61	4,100	4,161	764	4,864	55
H.P.	16,512	348	65,160	82,020	227,375	309,395	16,982	244,337	24,295
Total.....No.	104	139	57	300	8,607	8,907	1,063	9,670	174
H.P.	28,467	13,565	89,868	131,840	425,954	557,794	24,811	450,765	35,398
NON-METAL MINING INCLUDING FUELS—									
Fuels									
Coal.....No.	417	69	2	488	1,082	1,570	968	2,050	405
H.P.	110,662	1,093	12,000	123,755	38,028	161,783	68,864	106,892	73,760
Natural Gas.....No.	9	145	.....	154	26	180	13	39	9
H.P.	225	2,750	.....	2,975	701	3,676	202	903	375
Petroleum.....No.	45	60	.....	105	57	162	17	74	89
H.P.	3,045	3,073	.....	6,118	455	6,573	248	703	7,125
Total.....No.	471	274	2	747	1,165	1,912	998	2,163	503
H.P.	113,932	6,916	12,000	132,848	39,184	172,032	69,314	108,498	81,260

* Electricity also generated, used largely for lighting purposes and dredging.

Table 29.—Power Employed in the Mineral Industry in Canada by Industries, 1931, with Comparative Totals for 1930—Concluded

Industry	Steam engines and turbines	Internal Combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
NON-METAL MINING INCLUDING FUELS—Con.									
<i>Other Non-Metal Mining</i>									
Abrasives.....No.	2	1		3	3	6		3	2
H.P.	205	30		235	13	248		13	235
Asbestos.....No.	4	3		7	550	557		550	7
H.P.	110	163		273	32,828	33,101		32,828	1,100
Feldspar and Quartz.....No.	28	11		39	16	55		16	14
H.P.	671	304		975	363	1,338		963	860
Gypsum.....No.	13	52		65	226	291		287	8
H.P.	1,193	3,027		4,220	6,708	10,928	61	847	970
Iron Oxides.....No.					6	6		6	1
H.P.					123	123		123	3
Mica.....No.				1	3	4		3	2
H.P.			145	145	3	148		3	85
Salt.....No.	7	4		11	31	42		134	6
H.P.	140	375		515	366	881	1,412	1,778	2,715
Talc and Soapstone.....No.					17	17		17	1
H.P.					620	620		620	80
†Miscellaneous.....No.	7	18		25	55	80		57	9
H.P.	645	1,322		1,967	2,245	4,212	660	2,905	650
Total.....No.	61	89	1	151	907	1,058	252	1,159	50
H.P.	2,964	5,221	145	8,330	43,269	51,599	2,919	46,188	6,710
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—									
Cement.....No.	5	6	9	20	1,190	1,210	72	1,262	15
H.P.	2,113	205	5,336	7,654	70,472	78,126	2,954	73,426	3,425
Clay Products.....No.	85	50		135	553	688	15	568	86
H.P.	7,103	1,520		8,623	19,653	28,276	539	20,192	7,488
Lime.....No.	18	12	2	32	267	299	40	307	26
H.P.	517	418	80	1,015	4,648	5,663	650	5,298	1,555
Sand and Gravel.....No.	46	67	5	118	261	379	2	263	34
H.P.	2,659	2,067	350	5,076	8,659	13,735	45	8,704	1,425
Stone.....No.	109	125	14	248	803	1,051	15	818	91
H.P.	5,241	4,966	1,305	11,512	24,242	35,754	544	24,786	4,612
Total.....No.	263	260	30	553	3,074	3,627	144	3,218	252
H.P.	17,633	9,176	7,071	33,880	127,674	161,554	4,732	132,406	18,505
Grand total 1931.....No.	899	762	90	1,751	13,753	15,504	2,457	16,210	979
H.P.	162,936	34,878	109,084	306,898	636,081	942,929	101,776	737,851	141,873
Grand total 1930.....No.	939	695	99	1,733	13,285	15,018	2,507	15,792	1,066
H.P.	165,561	34,728	110,671	310,960	613,463	924,422	109,751	723,213	142,192

† Includes data for peat.

Table 30.—Accidents in the Mining Industry in Canada, by Provinces*, 1931

Cause of Accident	Nova Scotia		New Brunswick		Quebec		Ontario		Saskatchewan		Alberta		British Columbia		Canada	
	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal
UNDERGROUND—																
Falls of roof or face.....	14	361	2	48	6	79	9	107	1	20	9	38	6	230	47	883
Mine cars and locomotives.....	6	290		30	1	38		29		34	3	4	3	131	13	593
Gas and dust explosions.....	6	5									2			1	8	11
Explosives.....		1		7	1	5	2	13		3		8		2	3	39
Electricity.....														2		2
Miscellaneous.....	2	404	1	58		276	10	1,116		58	1	36	2	488	16	2,436
Total.....	28	1,061	3	143	8	398	21	1,265	1	115	15	128	11	854	87	3,964
SURFACE—																
Haulage and cars.....	3	49		11		21	2	24		10	1	8	1	31	7	154
Machinery.....		20		5		30	3	65		6			2	48	5	174
Miscellaneous.....		141		10	3	106	10	476		36		12	3	285	16	1,064
Total.....	3	210		26	3	157	15	565		50	1	20	6	364	28	1,392
Grand Total.....	31	1,271	3	169	11	555	36	1,830	1	165	16	148	17	1,218	115	5,356

*Data for Manitoba not available.

CHAPTER TWO

THE GOLD MINING INDUSTRY IN CANADA

(With tables showing the production of gold)

1. General Review.
2. Review of the Gold Mining Industry in Canada by Areas.
3. The Alluvial Gold Mining Industry.
4. The Auriferous Quartz Mining Industry.
5. The Copper-Gold-Silver Mining Industry.
6. Commodity Statistics—including tables showing production by provinces, imports, exports, and world output of gold.

1. General Review

CANADA

(a) **Definition of the Industry.**—Canada's gold mining industry is classified into three main divisions: the direct recovery of placer gold or the alluvial gold mining industry; the extraction of the metal from gold-bearing quartz ores, designated as the auriferous quartz mining industry; and the supply coming, as a by-product, from the metallurgical treatment of base metal ores and, in this classification, called the copper-gold-silver mining industry. Gold obtained in the copper-nickel, silver-lead, and other mining or associated industries is included in the total annual production of the country.

(b) **Historical.**—The early history (1850-1895) of gold production in Canada is largely confined to the placer operations of the pioneer prospector in British Columbia and it was from this source that most of the metal was derived until the discovery, in 1896, of the extremely rich gravels of the Klondike river in the Yukon Territory; between 1898 and 1905 gold to the value of more than \$100,000,000 (4,838,000 fine ounces) is stated to have been obtained from the placers of the Bonanza, Eldorado, Hunker, Dominion and Sulphur Creeks. Almost coincident with this western activity was witnessed the Lake of the Woods discoveries in Ontario and renewed activity on the Nova Scotia quartz veins. The past fifteen to twenty years, although witnessing the decline of the alluvial gold industry, have given to the nation the highly productive auriferous quartz mines of the Porcupine and Kirkland Lake camps in Ontario and of the Portland Canal district in British Columbia. The base metal mining industries are now contributing important and increasing quantities of gold to Canada's total production. This has been most highly reflected in the growing gold production originating in the recent expansion in copper-nickel and copper-gold mining industries; the increase from the latter industry is strikingly exemplified in the recovery of this metal as the result of extensive mining and metallurgical developments at the Noranda copper mine in the province of Quebec.

(c) **Sources.**—In 1931 the auriferous quartz mines contributed bullion amounting to 2,170,923 fine ounces, or 80.58 per cent of the total Dominion production; alluvial deposits 58,203 fine ounces, or 2.16 per cent; fine gold in blister copper and base bullion made at Canadian smelters from domestic ores, 387,346 fine ounces, or 14.38 per cent; and the estimated recovery of 77,420 fine ounces of gold in ores, matte, slags and concentrates exported to foreign smelters comprised the balance.

(d) **Importance of the Industry.**—Gold held first place in point of value among Canada's mineral products in 1931. The value of gold represented 24.43 per cent of the total mineral production of the Dominion in 1931. As a world producer of gold, Canada now ranks second; the Union of South Africa was first with a production from the Witwatersrand, Heidelberg, and other districts of 10,877,777 fine ounces, and the United States (exclusive of the Philippine Islands) was third with an output of 2,221,878 fine ounces. Southern Rhodesia produced 532,111 fine ounces during 1931 and the Australian output amounted to 602,671 fine ounces. The discovery and development of our more important Canadian gold deposits have not only contributed directly to the wealth of the nation but have assisted materially in the colonization of virgin lands, the harnessing of important water powers, and the general development of our northern natural resources.

2. Review of the Gold Mining Industry by Areas

NOVA SCOTIA

Fine gold contained in bullion shipped from gold mines in Nova Scotia to the Royal Mint, Ottawa, during 1931 totalled 460 ounces. Two properties were reported as producing and two were active on development. The Fiske Block, Malaga Barrens, Queens county, and the Renfrew mine in Hants county produced crude gold bullion. Diamond drilling of the King Fissure in Queens county was carried on by the United Goldfields of Nova Scotia, Ltd., and gold arsenical concentrates were produced at the Boston Richardson in Guysboro county. There were, in 1927, one hundred known localities in Nova Scotia where gold had been found in situ; of these 55 were classed as gold districts. The recorded gold production of Nova Scotia from 1862 to 1931 inclusive amounted to 924,208 fine ounces valued at \$19,105,157. Mining of this metal in the province dates back to the early sixties. Annual yields varying from 6,863 fine ounces to 30,348 fine ounces are recorded from 1862 to 1902. In 1904 production fell to 10,362 ounces and remained close to this quantity until 1910, since then there has been no appreciable increase in production.

In the Nova Scotia deposits gold occurs usually in the free state and sometimes as rich concentrations of native metal in comparatively narrow quartz veins or multiple vein systems called belts. Values in some ore bodies are associated with arsenopyrite and antimony. The veins occur, in most instances, in anticlinal folds of slate or quartzite.

Hydro-electric power is now available throughout a large part of the province.

QUEBEC

Quebec with a production of 300,075 fine ounces of gold in 1931 has advanced in importance among the gold producing provinces from a position of sixth in 1924 to second in 1931. This increase, especially since 1928, has been largely due to the recovery of gold from blister copper produced at the Noranda smelter; this gold production coming from the sulphide ores of the Horne mine is now an important item in Canada's precious metal output.

There were in the province of Quebec in 1931 four auriferous quartz mines producing and eleven under development or exploration. These mines showed an output of 47,446 ounces of fine gold contained in crude bullion and 938 ounces in ores shipped. Siscoe Gold Mines, Ltd., located approximately 30 miles east of Rouyn, increased the capacity of their mill early in 1931 to 150 tons per day and through improvements in milling practices reached a maximum capacity of 180 tons per day. In 1931 production was more than doubled over the previous year, partly due to increased tonnage of ore treated and in part to higher millheads. Average values are stated to run over \$13.00 a ton. Granada Gold Mines, Ltd., located in the southwest corner of Rouyn township, was a steady producer throughout the year; an official statement issued in October, 1931, stated that a very considerable tonnage of ore had been blocked out and proven. The Cadillac O'Brien, in Cadillac township, operated continuously and made shipments of high grade ore. In Barraute township the Consolidated Venus Gold Mines produced for the first time.

Prospecting and development work actively carried on throughout 1931 in the new gold area of Pascalis-Louvicourt townships in Abitibi has given very encouraging results. It has been decided to erect mining and milling plants on the large low grade gold deposits of the Beattie claims in Duparquet township. Nipissing Mines Company Limited and Ventures Limited are associated in the development of this property; it is stated that over 3,500,000 tons of ore averaging \$3.50 per ton have been indicated by diamond drilling. The Treadwell Yukon Company state that, while it was not possible in 1931 to make a reliable estimate of the average value of mine run ore on their Bussière prospect in the Pascalis district, the information available suggests a value of about \$10.00 per ton; approximately 10,000 feet of diamond drilling has been done on this property and a test milling plant will be installed. Veins are numerous and where exposed have an average width of 5 to 6 feet; gold is widely distributed but values appear to be rather erratic.

From 1877 to the end of 1931 the province of Quebec produced from all sources 334,548 fine ounces of gold valued at \$6,915,682. It is interesting to note that at the end of 1927 the total production for the province was only 41,997 fine ounces worth \$868,117. This pronounced increase represents the recent and rapid expansion in the mining of auriferous ores in new mines situated in the northwestern part of the province.

ONTARIO

A remarkable increase in the production of gold from Ontario mines has occurred during the past twenty years. Almost continuous systematic exploration and development during recent years, of important auriferous quartz vein systems, together with improvements in both mining and milling practices evidence their repercussion in the present high record gold production of the province.

Ontario mines, during 1931, produced 2,085,814 fine ounces of gold, or 77.4 per cent of the Canadian gold production. This output in comparison with the 1913 record of 219,801 ounces emphasizes the remarkable growth of the Ontario gold mining industry in less than two decades.

Twenty auriferous quartz properties in Ontario were reported as producing in 1931. Ten others were active in exploration or development work.

The mines of the Porcupine camp produced 962,252 fine ounces valued at \$19,891,513, those of the Kirkland Lake area, 1,051,377 fine ounces worth \$21,733,891, and auriferous quartz mines in other parts of the province, 48,804 ounces with a valuation of \$1,008,868. In Porcupine the Hollinger mill operated at from sixty-five to seventy-five per cent capacity, practically without interruption throughout the year, twelve levels are being opened up from the 2,750 to the 3,950, satisfactory ore has been encountered in all; it is confidently expected that the ore bodies will persist below the 3,950 level. So far the value per ton below the 2,000 foot was \$6.43. During the year the ore milled from below the 2,000 foot level was 402,724 tons, equal to 24.6 per cent. The new Dome mill (all cyanide) operated throughout the year and an amalgamation unit was added. At the McIntyre the recently constructed 2,000 ton mill reached capacity during the latter part of the year. The Porcupine United closed down in March; the Croesus mine in Munro township was re-opened in October and a 50 ton mill is being installed by the Hayden Gold Mines located in Deloro and Ogden townships. Coniaurum, Vipond and March Gold were all active producers throughout the year.

In Kirkland Lake, mining and development were continuous on the properties of the more important producers. Lake Shore Mines, Limited report that during the fiscal year ending June 30, 1931, 698,624 tons of ore were milled and \$9,152,935 in bullion produced. The company reports a total cost per ton of ore mined and milled at \$6.680 including depreciation, etc. A large amount of development work at this property resulted in a very substantial increase in blocked-out reserves. Kirkland Lake Gold Mining Company continued to sink from the 4,300 to the 4,750 foot levels and in doing this, as well as in continuing exploration above the 4,300 foot level, have opened up several shoots of ore in the porphyry and associated rocks. This property is now mining at the greatest depths in Canada. Teck-Hughes Gold Mines Limited state that for the fiscal year ending August 31, 1931, 396,200 tons of ore were treated and bullion amounting to \$5,973,120 or \$15.08 per ton recovered; the company report a cost per ton of ore treated at \$6.06 including depreciation and a cost per ounce of gold produced at \$8.305. Milling operations by May 1st were placed on a scale of 1,300 tons per day. The technical estimate of the "positive ore" reserve at September 1st, 1931, is as follows: broken ore, 313,691 tons average grade \$14.41; blocked ore, 331,693 tons average grade \$14.15. In January 1931, the Toburn Gold Mines Limited, was formed to take title to an option upon the Tough-Oakes-Burnside gold property; exploration and development carried on at this property throughout the year aggregated 8,897 feet of drifting, crosscutting, etc., and 1,250 feet of diamond drilling. The company reports the finding of good ore between the Sylvanite eastern boundary and the "N-S" dyke on the Tough-Oakes. The Lake Shore after a year's experimental work, installed a 200 ton flotation unit in its mill and in addition this company, in conjunction with Wright-Hargreaves, has under construction a \$250,000 tailings recovery plant. During the year the concentrating plant of the Telluride Gold Mines in Skead township was destroyed by fire. Sylvanite Gold Mines was a steady producer in 1931.

In the Red Lake district of northwestern Ontario the Howey mine produced steadily during 1931. Prospecting for gold was widespread throughout the northern parts of the province. Promising discoveries were reported in the Bannockburn area where development of the Ashley mine is approaching production condition; construction on a 150 ton daily capacity mill will commence in the spring and the plant should be in profitable operation late in 1932. Gold

discoveries were made in the Chester-Three Duck Lake area, southwest of Gogama on the C.N.R. and in the Swayze area, 40 miles west of Chester. In the Michipicoten district the Parkhill and Minto gold mines produced bullion, and at the Moss mine, west of Fort William, construction was commenced on a 200 ton gold mill.

The metallurgical plants of the International Nickel Company produce a considerable amount of gold in the treatment of the copper-nickel ores mined in the Sudbury district. The new electrolytic refinery of the Ontario Refining Company at Copper Cliff was successfully operated during the year. Gold and silver contained in Frood and Garson ores are recovered at this refinery.

Production of gold in Ontario from all sources from 1887 to 1931, inclusive, totalled 16,947,136 fine ounces valued at \$350,328,386.

· PRAIRIE PROVINCES

Manitoba, Saskatchewan and Alberta.—The greater portion of the southern sections of these three provinces is underlain by a series of post Cambrian sediments, a series of rocks unlikely to contain gold bearing deposits.

Large areas of pre-Cambrian rocks exist in the northern parts of Manitoba and Saskatchewan. In Alberta the expanse of these older formations is much less; consisting of about 5,000 square miles. It was only during recent years that anything approaching a widespread exploration of these virgin areas has been attempted. Transportation facilities were, until lately, quite limited and the movement of supplies was more or less restricted to the main waterways. The topography and geology are generally similar to those of the eastern Archæan peneplain with possibly a greater proportion of muskeg or bog land. Aerial transportation and photography have, in the last few years, been of great benefit to the explorer and prospector in the northern sections of the Prairie provinces. Prospectors with supplies and light mining equipment are now able to reach the most remote sections with comparative ease.

Gold has been found over widely scattered sections in Manitoba and in a few localities in Saskatchewan.

There is no record of any important gold production from Alberta. Efforts to profitably recover comparatively small quantities of gold contained in the sand and gravels of the Saskatchewan river have been attempted and it is reported that a gold dredge will be constructed and placed in operation on the McLeod river sometime during 1932. A small output of placer gold is recorded for Alberta in 1931.

Manitoba reported three auriferous quartz mines as producing and two under development. Output of gold bullion produced amounted to 25,902 fine ounces and 51 ounces were contained in ores and concentrates shipped. The Central Manitoba mine in the Beresford Lake section of eastern Manitoba is the largest producer of auriferous quartz ores in Manitoba. Operations at the property were continuous during 1931. The Kiskoba mine, situated at Herb Lake, shipped auriferous quartz ore to the Trail smelter in British Columbia; the San Antonio in the Rice Lake area, eastern Manitoba, carried on mine development, mill construction and diamond drilling preparatory to entering the producing stage. Interesting discoveries of quartz gold ores were made in 1931 at Island Lake, northeastern Manitoba; options were acquired by prominent mining companies and preparations made to explore these occurrences by diamond drilling. The first shipment of gold was made from the Gem Lake mine in 1931; this property, which has been under development during recent years, is situated close to the eastern provincial boundary and almost west of the active mining district of Red Lake in Ontario. Copper-zinc-gold ores were developed and mined at the Flin Flon and Sherritt-Gordon mines.

The total recorded gold production from all sources in Manitoba as from 1917 to 1931 inclusive, amounts to 75,696 fine ounces valued at \$1,564,774; a distinct increase occurred in 1931 owing to the increasing production of auriferous blister copper at the new Flin Flon plant of the Hudson Bay Mining and Smelting Company Ltd.

BRITISH COLUMBIA

In 1931 British Columbia produced 160,069 ounces of fine gold valued at \$3,308,920 as compared with 164,331 ounces and \$3,397,023 in 1930; of the 1931 production, alluvial gold contributed 13,741 ounces valued at \$284,052. Fine gold contained in blister copper made

at the Anyox smelter of the Granby Consolidated Mining and Smelting Company and in base bullion and in matte and ores exported in 1931 totalled 109,095 ounces valued at \$2,255,194 as compared with a corresponding production of 125,990 ounces valued at \$2,604,444 during 1930.

British Columbia auriferous quartz producers numbered 13 in 1931. Two mines were under development; 37,233 fine ounces were recovered in gold bullion produced at auriferous quartz mines while 60,673 fine ounces were contained in gold ores exported for treatment in foreign smelters. Lesser quantities were contained in ores and slags shipped to Canadian plants.

In the Northwestern District (1), which includes Portland Canal mining division, potential gold resources are becoming increasingly apparent and a marked interest in the discovery of gold areas is being displayed. Attention is also being directed to possibilities for profitable gold production from properties with small tonnage potentialities. Operations at the Premier were continuous and some new ore-bodies lateral to the main zone were discovered between the second and third levels; a 100 ton concentrator was completed at the Big Missouri to test the reliability of mine sampling. This mill treated 24,846 tons of ore, the mining of this tonnage proved that the high grade areas, indicated by the preliminary work and drill holes, were very limited; the holdings are very large and surface prospecting may indicate a more favourable condition on other sections of the claims.

In the Cariboo mining division, the Cariboo Gold Quartz Mining Company Limited carried out important exploratory work on their property and it is stated that the mine undoubtedly exhibits promise. Operations at the Pioneer in the Bridge River area, Lillooet mining division, were eminently satisfactory from development and production viewpoints; an average grade of \$20 has been maintained in the heads to the mill and development is well ahead of milling requirements. The vein on the 8th level has now been proved for a distance of 1,860 feet; work on a new three compartment shaft is being hastened.

The Dawson Gold Mines Limited, operating the old Emancipation mine in the Yale mining division, continued small scale operations and the old mill was reconditioned and placed in operation for treatment of selected ore from the mine. In the Grand Forks mining division, operations at the Union Mine were considerable and additions to the mill were necessary owing to the encountering of a new type of ore. The Hedley Gold Mining Company closed down the Nickel Plate Mine, in the Osoyoos mining division, owing to shortage of pay ore; some diamond drilling was done. Alexandria Gold Mines, Limited, situated on Phillips Arm, was under development practically all year; the lowest or beach tunnel at this mine was driven some 550 feet following a pyritized quartz vein for about 350 feet; it is reported that the results obtained in exploration were very encouraging. Production at the Reno Gold Mines in the Nelson division was steadily maintained in 1931 and satisfactory results attended the development work; the Second Relief on Erie creek was closed pending re-organization of the directorate, the mill operated for six weeks during the summer.

Production of gold from all sources in British Columbia from 1858 to 1931 totalled 10,390,874 fine ounces valued at \$214,798,467.

YUKON

The total alluvial gold production, together with a small quantity of the metal contained in silver-lead concentrates, amounted to 44,310 fine ounces in 1931. This output is in sad contrast to those of the old "boom" years in the Klondike when, during 1900, 1,077,553 fine ounces were recovered. Following the sensationally rich discoveries of '96 and '97 the production mounted rapidly for a few years. Then came a period of lessened individual recoveries, depleted values and the entry of large scale operators. Modern dredges and systematic hydraulic mining largely accounted for an increased production from 1909 to 1913. During the last decade the annual placer gold production in the Yukon has been much less than in former years.

Development work was continued in 1931 on the "Lone Star" group of claims on Victoria Gulch. Fifty-two car samples taken from crosscutting and raising averaged \$3.17 per ton. There is now reported a sufficient tonnage developed to supply a pilot mill.

In the Carmacks district one hundred and twenty-one quartz grants were issued and there has been considerable prospecting and development work carried on during the year. Five quartz claims were staked in the Liard district early in the spring.

The output of gold in the Yukon from 1885 to 1931 inclusive, amounted to 8,929,955 fine ounces worth \$184,598,203.

(3) The Alluvial Gold Mining Industry

It is very difficult to secure complete information on alluvial mining in Canada since placer fields are mostly remote and except in a few instances are operated by individuals of usually no fixed abode. Dredging and hydraulicking companies operating in the Yukon Territory send annual returns to the Bureau and with the aid of the Mining Lands Branch, Department of Interior, under whose regulations mining is carried on in this territory, more definite information is obtainable.

Alluvial gold mining is carried on principally in the Yukon Territory and in British Columbia; placer gold was recovered as early as 1823 from the gravels of the Chaudière river in Quebec; prospecting has been rather active in this district during recent years and in 1931 alluvial gold was produced in Beauce. This is the first recorded placer gold output from Quebec for several years.

The Gold Commissioner of the Yukon Territory reports that for the fiscal year ending March 31, 1932, the amount of placer gold mined during the year on which royalty export tax was paid was 54,152 ounces, royalty paid amounted to \$20,307. Fine gold equivalent to 44,061 ounces represented the placer output of the Territory for 1931 as compiled from returns supplied by the revenue division of the Department of the Interior. The Gold Commissioner reports that the Yukon Consolidated Gold Corporation Limited, operated five dredges in 1931. Gold was recovered from the gravels on or near Bear, Bonanza and Dominion creeks; hydraulic operations were conducted on Crofton and Lovett Hills. Cubic yardage removed by hydraulicking totalled 564,003 and ground dredged amounted to 4,139,290 cubic yards. This company employed an average of 250 men from April 1 to November 30th.

Many individuals and miners working in partnership were engaged in placer mining throughout the Territory and experienced a successful season. The dredge working in the glacier district and operated by the Holbrook Dredging Company Limited, was in operation from June 15 to November 15, the number of cubic yards dredged was 196,665 and the amount thawed 10,000.

Gold production in Alberta is compiled from returns supplied by the Royal Mint and represents recoveries of metal obtained in alluvial workings. During the year plans were advanced by the McLeod River Mining Corporation for the construction and operation of a gold dredge on McLeod river. Recoverable values in these gravels are stated to run from 17 cents to 29.8 cents per cubic yard.

Small quantities of crude gold were reported as having been recovered in 1931 from the Saskatchewan river sands; this metal was obtained through the efforts of individual operators.

Total gold production from Alberta from 1887 to 1931 inclusive totalled 15,224 fine ounces valued at \$314,710.

British Columbia alluvial gold operations yielded 17,176 ounces of crude gold as compared with 8,955 ounces in 1930; 127 miles of ditches were reported and 1,587,271 cubic yards of material were handled. Values were obtained from both bench and stream workings, the latter including beach and bar gravels. Mining operations were carried on both underground and on the surface. Metal recoveries by surface mining were obtained by sluicing, rocking and panning; equipment employed included monitors, drag line scrapers, tractors and rockers. Ocean beach sands treated on the shore of Graham Island resulted in the recovery of a small amount of crude gold. In the Stikine mining division, on the north fork of the Clearwater river, the Barrington interests have successfully completed the installation of a Risdon, New Zealand type, 1,500 cubic yards per day rated capacity dredge. This was expected to commence operations at the opening of the 1932 season. In the Liard mining division on Dease Creek a hole drilled 160 feet to bed rock is reported to reveal values of 46.75 cents to the cubic yard; several operators were active on this creek during the year. Placer mining was very active in the Atlin area, good recoveries have been made and encouraging results attained. Discoveries and development in the older sections of District 2, which includes Cariboo, Omineca and Quesnel mining divisions, were the most important of recent years and encourage high hopes for the future and it is stated by the British Columbia Department of Mines, that, in the Quesnel mining division, it is clearly becoming more evident that the older placer sections contain much commercially recoverable gold. Numerous unemployed men operated along the edges of the Tulameen and Similkameen rivers resulting in the recovery of many odd lots of gold and platinum.

Table 31.—Principal Statistics of the Alluvial Gold Mining Industry in Canada, 1930 and 1931

Item	British Columbia		(a) Yukon		Canada	
	1930	1931	1930	1931	1930	1931
Number of firms and individual operators*	60	105	19	4	79	109
Time in operation—months.....	6.8	6.8	6.8	6.8	6.8	6.8
Capital employed..... \$	1,927,119	1,881,891	3,954,501	4,026,110	5,881,620	5,908,001
Number of employees.....	195	165	199	172	394	337
Salaries and wages paid..... \$	187,000	235,924	425,369	447,011	612,369	682,935
Fuel and electricity used..... \$	6,739	20,906	1,533	20,839	8,272	41,745
Electricity generated—						
(a) for own use..... k.w.h.			11,696,500	11,387,391	11,696,500	11,387,391
(b) for sale..... k.w.h.			2,834,200	2,424,909	2,834,200	2,424,909
Value of electricity sold..... \$			28,342	24,249	28,342	24,249
Crude gold recovered..... crude oz.	8,955	17,176	43,950	55,315	52,905	72,491
Value of gold and silver..... \$	152,235	291,992	724,772	932,766	877,007	1,224,758
Platinum recovered..... crude oz.	17	50			17	58
Value of platinum recovered..... \$	771	1,783			771	1,783
Quantity of material handled..... cubic yd.	224,339	1,587,271	3,559,642	4,914,638	3,783,981	6,501,909
Length of ditches..... miles	105	127	121	123	226	250
Total value of alluvial production..... \$	153,006	293,775	724,772	932,766	877,778	1,226,541

*In addition to the number shown in the table there were many individual operators from whom no returns were available. (a) Includes one company operating in Quebec.

A small amount of alluvial gold is recovered in Alberta, data relating to this production are not included in this table.

4. The Auriferous Quartz Mining Industry.

This industry includes the mining and milling of ores in which gold is the predominating metal in value, quartz the prevailing gangue and from which the values are usually recovered by various methods of cyanidation or amalgamation. Refractory ores containing lead, copper, arsenic, antimony or other metals are usually concentrated by selective flotation or other methods and the gold bearing concentrates shipped to smelters for further treatment.

The majority of the larger gold mines in Ontario have adopted straight cyanidation, a few of the smaller producers make recoveries only by amalgamation and in some mills a combination of the two methods has been adopted. The recent introduction of flotation methods in the treatment of some of the Northern Ontario gold ores has materially increased efficiency in milling practice. There is, in the ores from the large Ontario mines, an average proportion of 7 ounces of gold to 1 of silver. A greater variety of gold ores is usually mined in British Columbia than in any of the other provinces. As a general rule each ore with its own peculiar mineral characteristics requires its own individual extraction methods. The high-grade gold-silver-lead ores of the Premier mine in British Columbia are concentrated and the products shipped to other plants for smelting and recovery of the precious metals.

Table 32.—Capital Employed by Provinces in the Auriferous Quartz Mining Industry in Canada, 1930 and 1931

—	*Nova Scotia		Quebec		Ontario		British Columbia		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930										
Producing.....	5	4,425,631	3	6,228,229	20	89,637,363	9	12,136,291	37	112,427,514
Operating but not producing.....	1	89,000			15	6,871,788	3	369,755	19	7,330,543
Total.....	6	4,514,631	3	6,228,229	35	96,509,151	12	12,506,046	56	119,758,057
1931										
Producing.....	5	3,798,453	4	4,279,256	20	84,062,380	13	6,674,982	42	98,815,071
Operating but not producing.....	4	222,197	11	459,733	10	10,178,861	2	257,302	27	11,118,093
Total.....	9	4,020,650	15	4,738,989	30	94,241,241	15	6,932,284	69	109,933,164

*Includes data for 1 producing and 1 non-producing in Manitoba in 1930 and 3 producing and 2 non-producing in 1931.

Table 33.—Ores Mined and Milled, Crude Bullion Produced and Shipped from the Auriferous Quartz Mines in Canada, by Provinces, 1930 and 1931

	*Nova Scotia	Quebec	Ontario	British Columbia	Canada
1930					
Number of producing mines.....	5	3	20	9	37
Ore mined..... tons	56,801	59,194	3,972,692	384,116	4,472,803
Ore milled..... tons	47,932	43,906	3,946,590	268,441	4,306,869
Tailings re-treated..... tons			85	37,010	37,095
Bullion recovered by amalgamation..... crude oz.	619	25,258	33,592	1,156	60,625
Bullion recovered by cyanidation..... crude oz.	44,959	2,858	2,179,302	48,007	2,275,126
Bullion shipped..... crude oz.	35,188	28,116	2,213,302	49,163	2,325,769
Content of bullion shipped—Gold..... fine oz.	16,163	24,061	1,711,155	31,177	1,782,556
Silver..... fine oz.	2,083	2,292	293,440	2,593	300,408
Value..... \$	334,395	498,162	35,480,663	621,554	38,934,774
Exchange premium..... \$	5		36,702		36,707
Net value of ores, slags and residues sold..... \$	3,013	5,000	22,922	2,769,323	2,800,258
Total net receipts..... \$	337,413	503,162	35,540,287	3,390,877	39,771,739
1931					
Number of producing mines.....	5	4	20	13	42
Ore mined..... tons	55,587	94,779	5,041,002	374,058	5,565,426
Ore milled..... tons	46,934	81,802	5,025,018	296,822	5,450,576
Tailings re-treated..... tons	10		585	4,420	54,067
Bullion recovered by amalgamation..... crude oz.		49,051	2,875,338	38,130	2,742,880
Bullion recovered by cyanidation..... crude oz.	23,142	6,270	2,635,344	42,571	2,700,474
Bullion shipped..... crude oz.	56,702	55,857	2,635,344	42,571	2,700,474
Content of bullion shipped—Gold..... fine oz.	26,042	47,446	2,058,292	37,513	2,169,293
Silver..... fine oz.	3,779	3,167	356,845	6,843	370,634
Value..... \$	539,457	981,655	42,649,757	769,868	44,940,737
Exchange premium..... \$	17,580	55,003	1,784,956	36,510	1,894,049
Net value of ores, slags and residues sold..... \$	1,046	18,754	56,137	2,233,855	2,309,792
Total net receipts..... \$	558,083	1,055,412	44,490,850	3,040,233	49,144,578

*Includes data on 1 mine in Manitoba in 1930 and 3 in Manitoba in 1931.

Table 34.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1930 and 1931

Item	*Ontario mines shipping		†British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
1930					
Number of mines.....	6	3	6	3	17
Tons of ore, etc., shipped.....	40	49	53,689	88,777	142,555
Metal content—					
Gold..... oz.	442	920	32,250	68,623	102,235
Silver..... oz.	1,708	5,680	1,196,405	3,280,348	4,484,141
Copper..... lb.	2,382	491			2,873
Lead..... lb.			16,336	2,146,406	2,162,742
Zinc..... lb.					
Arsenic..... lb.				1,773,333	1,773,333
Net value..... \$	9,736	21,199	791,805	1,977,518	2,800,258
1931					
Number of mines.....	8	3	11	3	25
Tons of ore, etc., shipped.....	1,362	35	53,349	44,507	99,253
Metal content—					
Gold..... oz.	2,560	1,098	37,506	60,821	101,985
Silver..... oz.	1,317	6,432	1,076,289	1,271,079	2,355,117
Copper..... lb.					
Lead..... lb.			20,759	1,337,943	1,358,702
Zinc..... lb.					
Arsenic..... lb.					
Net value..... \$	51,994	23,943	907,279	1,326,576	2,309,792

*Includes data for 1 mine in Quebec and 1 in Manitoba in 1930 and 2 in Quebec and 2 in Manitoba in 1931.

†1 mine in British Columbia shipped to both Canadian and foreign smelters in 1930 and 1931.

Table 35.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada by Provinces, 1930 and 1931

Province	1930					1931							
	Number of employees					Salaries and wages	Number of employees					Salaries and wages	
	On salary	Wage-earners			Total employees		On salary	Wage-earners			Total employees		
		Sur-face	Under-ground	Mill				Sur-face	Under-ground	Mill			
Nova Scotia.....	2	19	14	4	39	13,395	1	4	3	.....	8	8,785
Quebec.....	18	86	78	18	200	353,602	52	146	147	20	365	538,058	
Ontario.....	371	1,664	4,741	581	7,357	12,226,108	432	1,894	5,598	611	8,535	14,530,388	
Manitoba.....	9	34	73	14	130	247,684	13	69	78	15	175	279,536	
British Columbia.....	66	214	282	113	675	1,193,831	55	159	264	75	553	1,110,398	
Canada.....	466	2,017	5,188	730	8,401	14,034,620	553	2,272	6,090	721	9,636	16,467,165	

THE COPPER-GOLD-SILVER MINING INDUSTRY

The copper-gold-silver mining industry comprises a group of mines producing ores in which copper is usually the predominating metal in both value and quantity. The precious metals in these ores, especially during periods of depressed base metal prices, are often very deciding factors in the economic working of some mines of this type.

In northwestern Manitoba and in the Rouyn district of Quebec, important ore deposits of copper-gold sulphide ores, some of which contain zinc in commercial quantities, have been successfully developed and mined during recent years.

Quebec.—In Quebec during 1931 the Consolidated Copper and Sulphur Company continuously operated the Eustis mines in the township of Ascot, producing both copper and iron sulphide concentrates. The copper concentrates were shipped to the United States. Owing to adverse conditions in the copper market the amount of copper produced at the Noranda mines in Rouyn was reduced but the gold production was more than doubled. Two discoveries at the mine during 1931, which favourably affected ore reserves, were the outlining by diamond drilling of 800,000 tons of silicious fluxing ore, estimated to average \$4.50 gold per ton with no copper, and the development of an ore shoot, estimated to contain 95,000 tons averaging \$29.00 gold per ton and 3.1 per cent copper at the west end of "H" ore-body between the 1st and 4th levels.

From information obtained in drifting, diamond drilling, etc., in the various Noranda ore bodies, there is now indicated above the 1,975 foot level the following tonnages of direct smelting ore, concentrating ore and flux:—direct smelting ore, 3,580,000 tons, \$3.45 in gold, 7.10 per cent copper; concentrating ore, 6,350,000 tons, \$3.62 in gold, 1.54 per cent copper; flux, 1,030,000 tons, \$4.42 in gold and 0.32 per cent copper. A summary of ore shipments from the mine to the smelter and concentrator in 1931 is as follows:—

	Tons	Copper	Gold	Silver
		%	\$	oz.
Direct smelting sulphide ore.....	426,008	5.94	6.86	0.91
Silicious fluxing ore.....	268,105	1.03	5.26	0.26
Concentrating sulphide ore.....	317,892	2.13	3.87	0.35
Total.....	1,012,005			

The concentrator treated 317,792 tons of Horne mine ore, the average assay of which was 2.12 per cent copper, 0.36 ounces silver and 0.19 ounces gold per ton from which 64,617 tons of concentrate were sent to the smelter.

The Aldermac mine and mill in Boischatel township prepared for production and it was expected that the property would commence producing copper and iron sulphide concentrates in January 1932.

As in 1930 practically all operations at the Waite-Ackerman-Montgomery Mines Limited were confined to exploration. A comparatively small tonnage of copper-gold-zinc ore was shipped to Noranda Mines Limited.

The copper and gold refinery of the Canadian Copper Refiners at Montreal East began operations in February, 1931 and produced steadily throughout the remainder of the year. This plant has a rated yearly capacity of 75,000 tons of electrolytically refined metal.

Copper and precious metals contained in blister copper made from Flin Flon ores in Manitoba and from ores smelted at the Noranda smelter, Rouyn, Quebec, are refined or recovered at this plant.

Ontario.—Practically all of the copper produced in Ontario during 1931 was obtained from the nickel-copper ores of the Sudbury area. The International Nickel Company mined a total of 1,580,355 tons of ore; the Copper Cliff smelter of the same company reported an output of 72,747 tons of bessemer matte and 22,013 tons of blister copper; Coniston smelter treated 427,717 tons of ore and produced 23,163 tons of bessemer matte. Output of blister copper at the Port Colborne refinery totalled 28,688 tons as compared with 59,503 tons in 1930. The new Copper Cliff refinery of the Ontario Refining Company was operated at approximately 50 per cent capacity. This plant electrolytically refines copper and recovers precious metals contained in blister copper produced in Ontario from ores mined by the International Nickel Company and blister copper produced by the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba, from Sherritt-Gordon ores. Some blister from the Anyox smelter of the Granby Company in British Columbia is also treated. The International Nickel Company reports that copper sales during the year, inclusive of copper in sulphate produced in Wales, decreased from 109,743,747 pounds in 1930 to 96,919,677 pounds in 1931 or 12 per cent; gold sales of the company were 23,384 ounces. Proven ore reserves as at December 31, 1931, aggregated 205,606,715 tons.

Falconbridge Nickel Mines Limited mined 133,721 tons of nickel-copper ores. The smelter of this company, located near the mine at Falconbridge, Ontario, produced in 1931, 4,363 tons of matte and copper recovered by the company totalled 1,033 short tons. Grade of ore mined was held at 2.453 per cent nickel and 1.007 copper after picking out 17.8 per cent high silica material for concentration. Ore reserves are reported as at December 31, 1931, at 2,725,382 tons averaging 2.31 per cent nickel and 0.94 per cent copper. Matte from this company is treated in Norway.

Manitoba.—Copper-gold-zinc ores are produced in the northwestern part of Manitoba; the Hudson Bay Mining and Smelting Company operates a large mine, copper smelter and zinc refinery at Flin Flon close to the Saskatchewan boundary. This company reports that in 1931, 1,090,596 tons of ore were mined and milled. This averaged 0.089 ounce gold, 1.09 ounces silver, 1.94 per cent copper and 3.82 per cent zinc per ton and from this were produced and sold 73,000 ounces of gold, 702,128 ounces of silver, 31,068,556 pounds of copper and 35,056,199 pounds of zinc. The total cost of operation including mining, milling, etc., was \$3.13 per ton milled; operation of the open pit was carried on continuously during the year, 706,564 tons of ore were removed which averaged gold, 0.076 ounces; silver, 1.01 ounces; copper, 1.8 per cent; zinc, 3.5 per cent. Ore mined underground and sent to concentrator totalled 390,693 tons assaying gold, 0.12 ounces; silver, 1.30 ounces; copper, 2.19 per cent; zinc, 4.4 per cent. The cyanide annex recovered, by a modification of the cyanide process, gold, silver and accessory copper out of the tailings discharged from the flotation section of the mill that treats the heavy sulphide ore. There were treated during 1931 in this plant 432,539 tons of sulphide ore tailings averaging per ton 0.04138 ounces gold and 0.05446 ounces silver. It was estimated in the 1929 report that to a depth of 900 feet and over an average width of seventy feet, reserves were 18,000,000 tons averaging with dilution 1.71 per cent copper, 3.45 per cent zinc, 0.074 ounces of gold, and 1.06 ounces of silver. The Island Falls power plant of this company operated continuously during the year. There were generated 166,630,000 kilowatt hours and the load factor at the plant was 80.5 per cent. The company reports both open and underground workings are in excellent condition for increased production.

Sherritt-Gordon Mines Limited mine and ship copper-gold ores at Sherridon, located in the Cold Lake area. During the early part of the year, to March 31st, plant construction was proceeded with and one unit of the mill installed ready for operation. In 1931 a total of 221,981 tons was mined and hoisted; of this 214,081 tons of ore went to the mill; the balance, 7,900 tons, was rock which went to surface dumps. The 214,081 tons of ore milled yielded 14,718,387 pounds of copper, 4,039 ounces of gold and 125,845 ounces of silver, after deducting smelter losses. The mill tonnage was stepped up as the mine output increased until, by the middle of May, the rated capacity of the unit, 600 tons in 24 hours, was reached. No attempt

was made to recover the zinc. Average assay of heads were: copper, 3.735 per cent; gold, 0.26 ounces; silver, 0.754 ounces. Percentage recoveries were copper, 95.05; gold, 76.56; silver, 82.00. The company states that the results of the nine months' period of operation have, on the whole, been very satisfactory. The grade of ore milled has been considerably above the average grade of the reserves. No work of an exploratory nature was attempted during the period under review, however, in advancing the third level east drive to open new stopes, the so-called "low grade section" mentioned in the 1929 report of the company and then tentatively estimated at 1,116,500 tons, 1.4 per cent copper, 25 cents gold, 61 cents silver, has been opened for a distance of one-third its length and to date averages 2.5 per cent copper. Mining, traming and hoisting costs were well under \$1.00 per ton from an average stope width of 12.5 feet.

British Columbia.—Copper-gold ores are rather widespread in British Columbia. The following are the most important copper mines in the province: Britannia mine situated at Britannia Beach in the Vancouver mining division; Copper Mountain mine located near Princeton in the Similkameen mining division; and the Hidden Creek and Bonanza mines near Anyox in the Nass river mining division.

The Britannia mine discovered in 1888 represented in 1930 an investment of \$10,000,000 for mine property, mill, etc. The property now possesses over sixty miles of underground work. Owing to the drastic decline in the price of copper it became necessary in 1931 to adopt a policy of retrenchment at Britannia, resulting at the close of the year in a restriction of copper marketed from production, of less than one-quarter of plant capacity. Provision has been made for storage of product not sold. Further development at the mine below the 2,700 level, having disclosed a most promising continuance of ores of commercial grade at depth, extension of the 4,100 adit (mill level) a distance of 10,000 feet was started in September. Britannia concentrates are treated in the United States for recovery of copper and precious metals.

The Granby Company curtailed by closing down the Copper Mountain mine; this property has been in production for several years. The Hidden Creek mine owned by the same company was operated at higher than ordinary rate, economies have been worked out resulting in the per pound cost of copper being steadily lowered during the year. Exploration and development have been energetically continued at the property. Operations at the Bonanza mine, owned and operated by the Granby Company were continuous and concentrates from both this and the Hidden Creek mine were smelted at the Anyox smelter of the company. Copper, gold and silver contents of these ores were eventually recovered in Canadian and United States copper refineries.

Northwest Territories.—Northern Aerial Minerals Exploration Limited state that during the 1931 season some trenching was done on the copper deposits of that company located in the Copper Mine River area. In one trench widths are reported from 12 to 15 feet and check sampling gave an average copper content of 47.13 per cent. The showing on "D" group of claims in the same area was trenched and disseminated chalcocite ore body was indicated. This is reported to average 9 per cent copper with a width of 8 feet for at least 1,100 feet in length. A diamond drill was transported to the first-mentioned property late in the 1931 season.

Ventures Limited report that diamond drilling on the Sloan Copper find at Hunter Bay, Great Bear Lake, indicated that an important body of copper ore existed averaging 8 per cent to 10 per cent copper.

Table 36.—Capital Employed by Provinces in the Copper-Gold-Silver Mining Industry in Canada, 1930 and 1931

	Quebec		Ontario		Manitoba		British Columbia		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930										
Producing.....	7	4,469,675	1		1	8,154,584	7	15,098,582	16	27,722,841
Operating but not producing.....	30	4,533,415	4	5,869,743	1	6,245,387	17	1,473,009	52	18,121,554
Total.....	37	9,003,090	5	5,869,743	2	14,399,971	24	16,571,591	68	45,844,395
1931										
Producing.....	3	1,453,195	.....	.....	2	17,154,849	10	8,740,858	15	27,348,902
Operating but not producing.....	28	4,182,063	1	140,500	.....	.....	12	5,456,455	41	9,779,018
Total.....	31	5,635,258	1	140,500	2	17,154,849	22	14,197,313	56	37,127,920

Table 37.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1930 and 1931

	Quebec and Manitoba	British Columbia	Canada
	tons	tons	tons
1930			
Ore mined.....	1,339,866	4,428,798	5,768,664
Ore milled.....	579,252	4,347,179	4,926,431
Copper concentrates produced.....	92,370	205,715	298,085
Pyrite concentrates produced.....	24,918	28,535	53,453
Zinc concentrates produced.....	31,882		31,882
1931			
Ore mined.....	2,403,442	3,599,423	6,002,865
Ore milled.....	1,697,188	3,546,194	5,243,382
Copper concentrates produced.....	304,179	164,880	469,059
Pyrite concentrates produced.....	29,149	34,144	63,293
Zinc concentrates produced.....	63,828		63,828

Table 38.—Shipments from Copper-Gold-Silver Mines in Canada, 1930 and 1931

Destination	Quantity	Net value	Content as determined by settlement assay				
			Gold	Silver	Copper	Sulphur	Zinc
1930	Tons	\$	Fine oz.	Fine oz.	Pounds	Tons	Pounds
11 mines shipped to Canadian smelters—							
Ores.....	724,966	4,049,084	109,043	437,034	70,487,335		1,748,920
Copper concentrates.....	172,772	4,425,673	39,583	659,875	46,921,698		
Zinc concentrates.....	20,800	208,000	2,870	52,950	767,000		13,478,000
10 mines shipped to Foreign smelters—							
*Ores.....	391	3,513	31	456	26,023		
†Copper concentrates.....	126,250	6,743,510	16,877	335,134	65,656,756		
Pyrite concentrates.....	53,453	145,084				27,682	
Zinc concentrates.....	11,082	54,700					11,527,280
Total.....	1,109,714	15,629,564	168,404	1,485,449	183,858,812	27,682	26,754,200
1931							
12 mines shipped to Canadian smelters—							
Ores.....	1,726,712	9,390,000	309,765	1,522,200	96,789,533		47,835,966
Copper concentrates.....	177,211	3,737,435	54,337	475,920	62,557,732		
Zinc concentrates.....	63,828	430,390	5,808	126,379	1,928,000		35,056,199
4 mines shipped to Foreign smelters—							
Ores.....	55	1,520	58	150	5,345		
Copper concentrates.....	71,015	2,236,631	5,396	164,957	35,012,918		
Pyrite concentrates(a).....	63,293	155,127				31,771	
Zinc concentrates.....							
Total.....	2,102,114	15,951,103	375,364	2,289,606	196,293,528	31,771	82,892,165

* Contains 1,003 pounds of nickel, 4 ounces of platinum and 14 ounces of palladium.

† Contains 690,111 pounds of copper in precipitates.

(a) Contains shipments to Canadian paper mills in Quebec.

Table 39.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, 1930 and 1931

	1930		1931	
	Number	Salaries and wages	Number	Salaries and wages
		\$		\$
SALARIED EMPLOYEES—				
Total.....	285	724,275	226	561,223
WAGE-EARNERS—				
Surface.....	1,803	8,432,484	834	4,397,094
Underground.....	3,097		1,768	
Mill.....	509		523	
Total.....	5,409	8,432,484	3,125	4,397,094
Grand total.....	5,694	9,156,759	3,351	4,958,317

Table 40.—Production of Gold in Canada by Provinces and by Sources, 1930 and 1931

Province	1930		1931	
	Fine ounces	Value	Fine ounces	Value
		\$		\$
NOVA SCOTIA—				
In gold bullion.....	1,272	26,295	460	9,509
QUEBEC—				
In blister copper, in gold bullion and in any ores exported.....	141,747	2,930,170	300,075	6,203,101
ONTARIO—				
Porcupine area—In gold bullion.....	858,603	17,748,899	961,567	19,877,353
In slags exported.....	481	9,943	685	14,160
Kirkland lake area—In gold bullion.....	830,293	17,163,679	1,050,964	21,725,353
In slags exported.....	440	9,096	413	8,538
Sudbury area—In blister copper and in matte and ores exported...	23,803	492,051	23,381	483,328
Miscellaneous.....	22,392	462,884	48,804	1,008,868
Total.....	1,736,012	35,886,552	2,085,814	43,117,600
MANITOBA—				
In gold bullion, in blister copper or ores shipped.....	23,189	479,359	102,969	2,128,558
ALBERTA—In alluvial gold.....			195	4,031
BRITISH COLUMBIA—				
In alluvial gold.....	7,164	148,093	13,741	284,052
In gold bullion.....	31,177	644,486	37,233	769,674
In blister copper.....	25,799	533,313	26,364	544,982
In base bullion and in ores or matte exported.....	100,191	2,071,131	82,731	1,710,202
Total.....	164,331	3,397,023	160,069	3,308,920
YUKON—				
In alluvial gold.....	35,160	726,822	44,061	910,822
In ores exported.....	357	7,380	249	5,147
Total.....	35,517	734,202	44,310	915,969
Total Canada.....	2,102,068	43,453,601	2,693,892	55,687,688

Table 41.—Production of Gold in Canada, 1922-1931

Year	Fine ounces*	Value	Year	Fine ounces*	Value
1922.....	1,263,364	26,116,050	1927.....	1,852,785	38,300,464
1923.....	1,233,341	25,495,421	1928.....	1,890,592	39,082,005
1924.....	1,525,382	31,532,443	1929.....	1,923,308	39,861,663
1925.....	1,735,735	35,880,826	1930.....	2,102,068	43,453,601
1926.....	1,754,228	36,263,110	1931.....	2,693,892	55,687,688

*Calculated from the value \$1=0.048375 ounces.

NOTE.—For years 1858 to 1921 see previous reports.

Refined Gold.—Fine gold was produced during 1931 at refineries operated by the Royal Mint at Ottawa; by the Hollinger Consolidated Gold Mines Ltd., Timmins, Ont.; by the Ontario Refining Company at Copper Cliff, Ontario; by the Canadian Copper Refiners Ltd., Montreal East, Quebec, and by the Consolidated Mining and Smelting Company at Trail, British Columbia.

Refined gold produced in the plants at Copper Cliff, Ontario, and Montreal East, Quebec, is produced chiefly from the precious metal residues recovered in the refining of blister copper. Refined gold produced at Trail comes principally from the extractions of the metal in treating silver-lead ores. Small quantities of imported gold ores are also treated at the Trail smelter.

Gold refined at the Royal Mint, Ottawa, from crude metal or bullion produced in Nova Scotia, Quebec, Ontario, Manitoba, Alberta, and British Columbia and from alluvial recoveries amounted to 1,721,237 fine ounces as compared with 862,075 fine ounces in 1930. These amounts include comparatively small quantities of secondary gold contained in scrap.

Table 42.—Receipts at the Royal Mint, Ottawa, Ont., by Sources, 1930 and 1931

Source	1930			1931		
	Gross weight	Precious metal content		Gross weight	Precious metal content	
		Fine gold	Fine silver		Fine gold	Fine silver
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
Nova Scotia.....	1,382.63	1,272.052	66.94	563.69	460.222	47.86
Quebec.....	26,264.37	22,905.661	1,936.81	137,568.54	129,451.047	3,643.39
Ontario.....	908,209.45	712,527.229	86,418.76	1,762,480.64	1,441,661.884	171,407.93
Manitoba.....	36,373.08	16,118.436	1,841.39	56,937.51	25,901.456	3,781.17
Alberta.....				11.77	8.935	0.95
British Columbia.....	47.43	30.976	14.08	48.40	40.438	4.35
Dominion of Canada Assay Office, Vancouver.....	115,459.86	94,592.486	14,762.05	116,787.19	94,145.269	16,985.85
Yukon.....	2.72	2.283	0.29	10.00	7.835	1.73
Jewellery and scrap, various sources.....	34,004.48	14,625.742	4,350.94	47,246.43	29,489.420	4,344.02
Foreign.....				78.04	70.097	0.55
Total.....	1,121,744.62	862,074.865	109,391.26	2,121,732.21	1,721,236.603	200,217.80

Table 43.—Quantity and Value of Gold produced in Canada, by Provinces, 1922-1931

(For the years 1862 to 1921, see Mineral Production of Canada, 1928)

Year	Nova Scotia		Quebec		Ontario		Manitoba	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1922.....	1,042	21,540			1,000,340	20,678,862	156	3,225
1923.....	655	13,540	667	13,788	971,704	20,086,904	31	641
1924.....	1,047	21,643	883	18,253	1,241,728	25,668,795	1,180	24,393
1925.....	1,626	33,612	1,602	33,116	1,461,039	30,202,357	4,424	91,452
1926.....	1,678	34,687	3,680	76,072	1,497,215	30,950,180	188	3,886
1927.....	3,151	65,137	8,331	172,217	1,627,050	33,634,108	182	3,762
1928.....	1,290	26,667	60,006	1,240,434	1,578,434	32,629,126	19,813	409,571
1929.....	2,687	55,545	90,798	1,876,961	1,622,267	33,535,234	22,455	464,186
1930.....	1,272	26,295	141,747	2,930,170	1,736,012	35,886,552	23,189	479,359
1931.....	460	9,509	300,075	6,203,101	2,085,814	43,117,600	102,969	2,128,558

Year	Saskatchewan		Alberta		British Columbia		Yukon	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1922.....					207,370	4,286,718	54,456	1,125,705
1923.....					200,140	4,137,261	60,144	1,243,287
1924.....					245,719	5,079,462	34,825	719,897
1925.....					219,227	4,531,824	47,817	988,465
1926.....					225,866	4,669,065	25,601	529,220
1927.....			42	868	183,094	3,784,889	30,935	639,483
1928.....			68	1,406	196,617	4,064,434	34,364	710,367
1929.....			5	103	154,204	3,187,680	35,892	741,954
1930.....					164,331	3,397,023	35,517	734,202
1931.....			195	4,031	160,069	3,308,920	44,310	915,969

From 1898 to March 31, 1932, royalties to the extent of \$4,997,083 were collected on the gold production of the Yukon. The yearly amounts collected, as well as the annual production of gold as ascertained by the Department of the Interior, are shown below. The difference between these figures and those shown in the table of annual production, which are based on mint receipts of Yukon gold is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at \$15 per ounce, (2) the probability that, in the earlier years of royalty collection, considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small production from lode mines.

Table 44.—Gold Production in the Yukon and the Royalty Collected, 1922-1932

(Supplied by the Mining Lands Branch of the Department of the Interior.)

(For years 1898 to 1921 see 1928 report on the Mineral production of Canada)

Fiscal year	Total gold production	Total exemption	Royalty collected on	Royalty paid
	\$	\$	\$	\$
Ending March, 1922.....	1,230,987		1,230,987	30,774.68
Ending March, 1923.....	1,032,762		1,032,762	25,819.04
Ending March, 1924.....	1,136,368		1,136,368	28,409.23
Ending March, 1925.....	625,459		625,459	15,636.48
Ending March, 1926..... Since 1902, the Dominion Government has..	879,819		879,819	21,995.50
Ending March, 1927... collected a royalty of 2½ per cent on all gold..	497,504		497,504	12,437.64
Ending March, 1928... produced; the Government for royalty pur..	568,221		568,221	14,205.55
Ending March, 1929... poses, places a nominal value of \$15 on each..	654,672		654,672	16,366.79
Ending March, 1930... crude ounce recovered.	657,537		657,537	16,438.42
Ending March, 1931.....	654,925		654,925	16,372.41
Ending March, 1932.....	812,285		812,285	20,307.36

Table 45.—Imports into Canada and Exports of Gold, 1929-1931

	1929	1930	1931
	\$	\$	\$
IMPORTS—			
Coin and bullion—			
Coins, British, Canadian and foreign gold coins.....	2,856,947	38,414,506	1,646,990
Gold bullion, in bars, blocks, ingots, drops, sheets or plates, unmanufactured...	889,541	705,782	391,003
Total.....	3,746,488	39,120,288	2,037,993
Gold, other—			
Bullion or fringe gold.....	37,401	18,543	9,506
Manufactures of gold and silver—			
Leaf.....	124,296	106,116	76,431
Sweepings.....	564	1,000	35
Manufactures, n.o.p.....	78,939	66,669	31,878
Electroplated ware and gilt ware, n.o.p.....	1,410,202	1,014,645	575,234

Table 46.—Comparative Figures of Gold Production, for the World, South Africa, United States and Canada, 1912-1931

Year	*World's output	†Union of South Africa output	*United States' output	Canada's output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1912.....	22,549,335	9,108,792	4,520,719	611,885
1913.....	22,249,596	8,798,712	4,299,784	802,973
1914.....	21,240,416	8,396,068	4,572,976	773,178
1915.....	22,760,788	9,096,411	4,887,604	918,056
1916.....	22,107,669	9,296,964	4,479,057	930,492
1917.....	20,289,546	9,018,389	4,051,440	738,831
1918.....	18,556,920	8,418,379	3,320,784	699,681
1919.....	17,695,037	8,331,651	2,918,628	766,764
1920.....	16,205,029	8,158,455	2,476,166	765,007
1921.....	15,974,962	8,128,710	2,422,006	926,329
1922.....	15,451,945	7,009,858	2,289,235	1,263,364
1923.....	17,790,597	9,149,073	2,426,495	1,233,341
1924.....	19,031,001	9,575,040	2,446,338	1,525,382
1925.....	19,025,942	9,597,592	2,319,920	1,735,735
1926.....	19,349,118	9,954,762	2,238,616	1,754,228
1927.....	19,397,757	10,122,491	2,117,253	1,852,785
1928.....	19,755,622	10,354,264	2,144,720	1,890,592
1929.....	19,500,152	10,412,326	2,056,629	1,928,308
1930.....	20,200,000	10,716,351	2,138,723	2,102,068
1931.....	21,300,000	10,877,777	2,221,878	2,693,892

*Figures taken from annual report of the Director of the Mint, Washington, from 1912 to 1929. From 1930 figures are supplied by *Imperial Institute*.†From the *Imperial Institute publications*.

Table 47.—World Production of Gold Ore, 1929-1931

(In terms of metal)

(Supplied by Imperial Institute)

Country	1929	1930	1931	Country	1929	1930	1931
	Fine ounces	Fine ounces	Fine ounces		Fine ounces	Fine ounces	Fine ounces
BRITISH EMPIRE—				FOREIGN COUNTRIES—Con.			
United Kingdom.....	12			Sweden.....	35,011	33,790	61,632
Anglo-Egyptian Sudan (exports of bullion).....	2,500	1,000	3,200	Belgian Congo.....	172,832	210,245	237,887
Bechuanaland Protector- ate.....	(f) 1,944	2,231	1,451	Egypt.....		542	
Gold Coast.....	207,851	240,899	261,651	French West Africa.....	3,151	2,283	(a)
Kenya.....	845	1,788	2,351	Madagascar.....	6,018	7,234	8,584
Nigeria.....	192	260	689	Mozambique.....	449	176	(a)
Northern Rhodesia.....	699	7,511	9,364	Mexico.....	651,873	671,871	623,003
Southern Rhodesia.....	560,813	547,630	532,111	United States (b).....	2,058,994	2,138,723	2,221,878
Sierra Leone (crude gold).....		720	5,700	Costa Rica (g).....	4,052	4,780	2,667
South West Africa.....	435	222	570	Guatemala (g).....	9,445	14,307	13,899
Swaziland.....	90			Honduras.....	10,246	13,498	(a)
Tanganyika Territory.....	9,071	11,072	14,528	Nicaragua (g).....	12,102	13,323	14,385
Union of South Africa.....	10,412,326	10,716,351	10,877,777	Panama.....	(g) 2,598	(g) 121	(e) 5,500
Canada.....	1,928,308	2,102,068	2,693,892	Salvador (g).....			13
British Guiana.....	6,200	5,893	10,183	Argentina (estimated).....	1,000	1,000	1,000
Federated Malay States.....	(c) 26,782	29,597	29,462	Bolivia.....	865		26
India.....	363,800	329,200	330,400	Brazil.....	109,803	143,775	(e) 100,000
Sarawak (exports).....	691	3,497	8,975	Chile.....	25,921	17,333	16,718
Australia.....	427,159	466,593	602,671	Colombia.....	76,657	(a)	(a)
New Guinea (years ended June 30).....	44,000	30,000	30,000	Dutch Guiana (crude gold).....	3,560	4,758	4,597
New Zealand.....	(d) 112,542	(d) 129,070	130,049	Ecuador.....	70,000	71,500	61,200
Papua (years ended June 30).....	1,624	2,367	4,305	French Guiana.....	48,932	43,917	43,531
Uganda.....			71	Peru.....	122,141	71,084	42,310
Total.....	14,100,000	14,600,000	15,600,000	Venezuela.....	46,477	58,729	42,310
FOREIGN COUNTRIES—				China.....	88,000	126,000	144,000
Czechoslovakia.....	9,354	9,418	5,743	Formosa.....	14,861	15,677	16,931
France.....	57,709	100,019	60,800	French Indo-China.....	514	870	(a)
Germany.....	5,823	6,067	4,128	Japan.....	335,078	387,983	430,238
Italy.....	3,409	2,942	3,409	Korea (estimated).....	160,000	180,000	(a)
Jugoslavia.....	18,500	23,006	30,000	Netherlands East Indies.....	109,702	110,448	(a)
Roumania.....	71,148	85,905	88,123	Philippine Islands.....	160,620	179,220	182,003
Russia (h).....	835,918	868,068	(a)	Turkey.....	(a)	(a)	220
				French Equatorial Africa.....		2,251	8,745
				Total.....	5,300,000	5,600,000	5,700,000
				World's Total.....	19,400,000	20,200,000	21,300,000

(a) Information not available.

(b) Amount recovered.

(c) Quantity placed on the market.

(d) Gold content of exports, excluding jewellers' sweepings.

(e) Estimated.

(f) Years ended February 28 of the year following that stated.

(g) Imports into the United States.

(h) Figures of Non-Ferrous Metals Trust, according to "Engineering and Mining World".

CHAPTER THREE

THE SILVER MINING INDUSTRY IN CANADA

Including the Silver-Cobalt Mining Industry, the Silver-Lead-Zinc Mining Industry, and Commodity Statistics Tables on Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review.
2. The Silver-Cobalt Mining Industry.
3. The Silver-Lead-Zinc Mining Industry.
4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review

(a) **Definition of the Industry.**—Silver mining is not a distinct industry in Canada, as silver is found, as an ore, only in association with those of other commercially valuable metals; with lead and zinc, as in many of the western mines; with the cobalt and nickel arsenides of northern Ontario, and in copper and other metalliferous ore deposits. Silver is nearly always found alloyed or associated with both alluvial and lode golds from which it is recovered in the refining of the crude gold bullion. This precious metal is, therefore, a rather common constituent in many of our mineral deposits, especially in those of the non-ferrous ores, and its value as a mine product is sometimes a deciding factor in the economical working of an ore body. It is the paramount value in the rich native silver-cobalt ores of Ontario, while in the silver-lead-zinc industry it is usually recovered as an important by-product. The mining and smelting of argentiferous lead and zinc ores are very important industries, especially in British Columbia, and the silver recovered from this type of ore is a distinct contribution to the mineral production of Canada. It is therefore realized that the mining and metallurgy of silver bearing ores are closely interwoven with those of other important metals principally lead and zinc and in order to make a comprehensive survey of the Canadian silver production it is imperative to consider its various sources of origin.

(b) **Historical.**—History pertaining to early Canadian silver and lead mining is meagre. We find in Cape Breton, evidence of early colonial efforts to mine galena ores, and from the records of the French regime we find mention by Champlain of argentiferous galena on the east shore of Lake Temiskaming, this deposit being later worked under the name of the Wright mine. It is stated that early last century small shipments of galena ore were made to Europe from deposits on the east shore of Hudson's Bay. In Ontario, silver-bearing veins were found as early as 1846 in the vicinity of Thunder Bay on Lake Superior. It was not until 1866 that Thomas McFarlane discovered in this district high grade silver ore in important commercial quantities. This, a sensational "find", was made on a small rocky island not more than 90 feet in diameter and located but a short distance off Thunder Cape. The property, later known as the Silver Islet mine, produced until 1884, the year of its abandonment, approximately \$3,250,000 in silver. Some of the other producing mines of this period in the Port Arthur district were the Silver Mountain, Beaver, Rabbit Mountain and Porcupine.

Construction of the Temiskaming and Northern Ontario railroad during 1903 was highly instrumental in the finding of one of the world's richest silver areas. Grading operations along what was then known as Long Lake in northern Ontario revealed veins possessing a mixture of unfamiliar minerals, leaves and wires of a white sectile metal were found on the surfaces of pinkish coated (erythrite) vein fillings. It was only after specimens of these "queer rocks" were sent south for identification and the announcement officially made of the discovery of important native silver and cobalt ores that the country became keenly interested. Silver discoveries and mine development in the South Lorraine and Gowganda areas followed shortly after the original finds at Cobalt and represent the results attained in the widened sphere of the prospecting activity subsequent to the first "boom" in Coleman township.

History is silent as to any important silver production or discoveries in the Prairie Provinces. Small amounts have been recorded as coming from either Manitoba or Alberta and chiefly represent the metal recovered in the refining of crude gold bullion. The dawn, or perhaps more aptly put, the false dawn of the silver-lead mining industry in British Columbia reaches back into the early decades of placer prospecting. The gravel miners penetrating the unexplored upper waters of the auriferous streams eventually encountered widespread evidence of metalliferous deposits. Rich float found in the valley bottoms was sometimes traced up the mountain sides to its source of origin, resulting in the discovery of potential mines. Early development and exploration was greatly delayed by lack of railroad facilities and it was not until late in the eighties that any appreciable production was registered. Small shipments aggregating \$37,925 were made in 1887 from various camps in the Kootenay district. It may be of interest, to note here, that the Monarch mine at Field, discovered in 1884, was a small shipper during 1887 and after 45 years of intermittent operation was reopened under sound financing in 1930 and again commenced shipping silver-lead-zinc ores under modern and more efficient mining methods. Active operations in the Ainsworth camp date from about 1888 and those in the Sardon-Silverton areas from about 1892. The discoveries of the North Star, Saint-Eugene and famous Sullivan deposits were made in East Kootenay during 1892 and 1893.

A rather common and outstanding characteristic of these usually complex ores is the intimate intermixture of the different sulphides, the clean separation of which is an essential to efficient smelting. Early methods of hand-sorting and crude jigging were for the most part futile, penalties lessened the miners' profits and the hill sides were often left with deserted workings. Intensive research and untiring effort have largely solved this perplexing problem through the introduction of selective flotation, and, in the almost continuous expansion and improvement of the great smelting, ore dressing, and other works of the Consolidated Mining and Smelting Company at Trail, we read the history of an immense and successful Canadian industry. Gold was discovered in the Yukon river as early as 1869 and we find, in succeeding years, a synchronous silver production which originated in the alluvial recoveries of the former crude metal. These silver values mounted to impressive figures during the height of the Klondike placer operations. Some argentiferous lode discoveries were made in the Yukon during 1899, but there appears to have been little, if any, production therefrom until 1910, in which year an output of 37,418 ounces of vein silver was recorded. In July, 1919, L. Beauvet made the first outstanding discovery of valuable silver-lead ores in commercial quantities. This find occurred at Keno Hill 40 miles northwest of the town of Mayo. Ore shipments from these deposits commenced during the winter of 1920-1921. It was during the latter year that the rich Sadie-Friendship vein was found. All ores and concentrates from this area are shipped to outside plants for smelting. Cost of transportation has always been a very important factor in the economical working of these mines. In the early days of the camp horse haulage of the ore to Mayo was nearly half the cost of shipping from mine to smelter, however, in 1922-23 the Treadwell-Yukon Company introduced caterpillar tractors reducing this item by nearly two-thirds. It is interesting to note that the frost zone in the Mayo district extends, at some mines, to a depth of over 400 feet.

(c) **Sources of Silver, Lead, Zinc, Cobalt and Arsenic.**—Statistics on the production of silver from Canadian ores include (a) silver contained in silver and gold bullion produced, (b) silver contained in blister copper or lead bullion made, and (c) silver estimated as recoverable from ores of all kinds exported for treatment in foreign smelters.

Figures on lead for 1931 include lead contained in base bullion made at the Trail smelter, lead estimated as recoverable from silver-lead-zinc ores shipped from mines of the Yukon, and the pig lead made at Galetta in Ontario. Small quantities of lead, contained in ores and silver-lead-bismuth bullion, recovered by the smelters treating cobalt ores are also included.

Canada's 1931 zinc output was in the form of refined metal produced by the Consolidated Mining and Smelting Company at Trail, B.C., and the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba.

For the past two decades the ores of the Cobalt district of Ontario have been the main source of the world's supply of cobalt, but since 1926, owing to the production of cobalt by the Union Minière du Haut Katanga, from Central African copper-bearing ores, Canada's production was reduced to less than half of the world's output.

Arsenic is produced in Canada from the cobalt-silver-nickel-arsenic ores of the Cobalt district by the smelter of the Deloro Smelting and Refining Company Limited, at Deloro, Ontario.

(d) **Importance of these Metals.**—Among the metals produced in Canada during 1931, lead held fourth place, silver fifth and zinc sixth in point of value. Canada ranked third in 1931 as a silver producing country; fourth among those producing lead and fourth in smelter output of zinc. The Belgian Congo and Canada are the two greatest cobalt producing countries, the production from the former has, during recent years, considerably surpassed that of the Dominion. From 1904 to 1910 the Canadian cobalt production figures represent an estimate of the cobalt content of the ores shipped from the mines. From 1911 until the present time cobalt production is computed by adding the cobalt metal and the cobalt content of all cobalt oxides and salts manufactured and sold by the Ontario smelters to the cobalt paid for in ores and residues exported for treatment in foreign smelters. Prevailing low prices and an instability of demand have prevented any expansion in the production of arsenic in Canada during recent years.

2. The Silver-Cobalt Mining Industry

Only mining and milling are considered in this chapter. Smelting of the cobalt ores, in so far as the Canadian operations are concerned, is treated in the chapter on "The Non-Ferrous Smelting and Refining Industry."

Following the production derived from Silver Islet and other properties of the Port Arthur district, comparatively little silver was produced in Ontario until the discovery in 1903 of the sensationally rich ores of the Cobalt area. From 1904, when the output of silver was over 3,000,000 ounces, the production increased rapidly until the peak was reached in 1910. In this year Ontario produced 30,366,366 ounces of silver, two years later production declined to 29,000,000 ounces and thereafter followed a generally downward trend until 1921 when less than 10,000,000 ounces were reported. Since 1921 the annual volume of production has fluctuated to some extent, and in 1931 the provincial production amounted to 7,438,951 ounces as compared with 10,205,683 ounces in 1930. Silver recovered as a by-product in the treatment of gold and copper-nickel ores is of increasing importance in offsetting the decline in the recovery of this metal from arsenical-cobalt ores.

Ontario is the only province producing cobalt and refined arsenic. The ores of some of the older mines in the Cobalt area have either been exhausted or seriously depleted and it is only by the intensive and efficient exploration and mining of a comparatively few properties in Gowganda, South Lorrain and the Cobalt camp proper that silver production has remained fairly constant.

The principal producing mining companies in this industry during 1931 were M. J. O'Brien Ltd., Nipissing Mining Co. Ltd., The Mining Corporation of Canada, Ltd., Keeley Silver Mines, and Castel Tretheway Mines Ltd. Properties were operated in South Lorrain, Cobalt and Gowganda. Some of the older properties in Coleman township were under lease to small operators and yielded various amounts of shipping ore.

Nipissing Mines report that practically all the known ore on the property was mined. An exploration shaft is, however, being sunk on Lot R.L. 402; now that the life of this famous mine is practically over, it is worthy to note that the Nipissing stockholders received from 1906 to 1931 inclusive, thirty million dollars or five times the capital stock of the company. The average price of silver during approximately the whole life of the company or from 1905 to 1931 was 63.402 cents, the high yearly average was 111.121 cents in 1919 and the low was 28.701 in 1931.

The Mining Corporation of Canada state that mining operations at South Lorrain have been discontinued. At Cobalt there still remains a limited tonnage of high-grade silver ore and the company anticipates that profitable operations can be maintained for several months. The mines of the Corporation have produced to December 31, 1931—49,019,150 ounces of silver. The O'Brien mine in Cobalt, together with the Miller-Lake O'Brien in Gowganda, continue to mine and ship high grade silver-cobalt ores.

A new cobalt-bearing deposit was investigated at Werner Lake, 40 miles north of Minaki, Ontario, by Kenora Prospectors and Miners, Ltd.; arrangements were made for the testing of these ores as to their economic value. The Deloro Smelting and Refining Co., Deloro, Ont., is, at present, the only company in Canada specializing in the treatment of cobalt-silver-arsenic ores.

Table 48.—Statistics of Silver-Cobalt Mine and Mill Operations in Canada, 1930 and 1931

	Unit of measure	1930	1931
Number of mines in operation.....		28	26
Ore mined.....	Tons	223,432	200,729
Ores treated.....	Tons	202,565	97,747
Tailings treated.....	Tons	4	
Concentrates produced.....	Tons	3,392	6,535
Quantity of material cyanided.....	Tons	40,406	39,173
Bullion recovered.....	Fine ounces	1,544,766	1,025,015
Bullion recovered by direct smelting.....	Fine ounces		
Bullions sold.....	Fine ounces	1,821,043	201,662
Net value of bullion, ore, concentrates and residues sold.....		3,637,181	1,925,593

Table 49.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
Capital employed as represented by:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	6,799,087	4,784,260
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	417,551	160,354
†(c) Inventory value of finished products on hand.....	5,051,684	713,606
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....		3,694,300
Total.....	12,268,322	9,352,520

†Included with item (b) in 1930.

Table 50.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1930 and 1931

	1930		1931	
	Number	Salaries and wages	Number	Salaries and wages
		\$		\$
SALARIED EMPLOYEES—				
Total.....	77	218,553	54	147,195
WAGE-EARNERS—				
Surface.....	230	1,270,038	195	1,002,494
Underground.....	598		439	
Mill.....	138		98	
Total.....	966	1,270,038	732	1,002,494
Grand Total.....	1,043	1,488,591	786	1,149,689

3. The Silver-Lead-Zinc Mining Industry

CANADA

Silver-lead-zinc ores are widely distributed in Canada. Deposits containing these metals have been either investigated or developed in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, the Yukon, and the Northwest Territories. The mining and metallurgical treatment of this type of ore is largely confined to British Columbia where the growth of this particular branch of the mining industry is closely associated with the successful development and treatment of the Sullivan mine ores by the Consolidated Mining and Smelting Company of Canada.

QUEBEC

Silver-lead-zinc ores were mined from 1910 to 1929 at the Tetreault Mine, Notre Dame des Anges; during the latter year 29,798 tons of flotation concentrates were shipped from this property to foreign smelters. This mine, although not producing in 1930 or 1931 carried on development. Considerable exploratory work was conducted on an extensive system of lead-zinc veins in Lemieux township, Gaspé. There was no production of lead or zinc in the province in 1931.

ONTARIO

Lead and zinc mineralization is fairly common in certain sections of Ontario. Several years ago lead ores were mined and smelted in Frontenac and Hastings counties. At present the greater part of the Ontario lead production comes from the Kingdon mine at Galetta. All of these deposits in eastern Ontario possess more or less common characteristics; veins are usually in or associated with crystalline limestones of the Grenville series and the vein matter generally consists of calcite, galena, and zinc blende. A distinctly different type of lead deposit is being developed at the Errington mine in the Sudbury field where ore deposition occurs in a major fault zone passing through slates and tuffs of pre-Cambrian age. The crushed zone is, in sections, several hundred feet wide; development indicates that the ore occurs in a number of separate and often parallel shoots. Ore consists of quartz, lead, zinc and copper sulphides, carbonate, rock inclusions and massive iron pyrites; the last mineral has been replaced, in part, by zinc blende, galena and copper pyrites. At Galetta, Ontario, the Kingdon Mining, Smelting and Manufacturing Company operated the Kingdon mine and smelter until August, 1931, when both mine and smelter were closed down. In the Sudbury area the Treadwell Yukon Company limited their operations at the Errington mine to exploration and development; no production was reported in 1931.

MANITOBA

Silver production in Manitoba during 1931 amounted to 836,547 fine ounces valued at \$249,877. This was contained in blister copper made at the Flin Flon smelter and in crude gold bullion produced from auriferous quartz ores. Copper deposits were developed during the war and from 1918 to 1920 shipments of copper ore containing silver were made to Trail, B.C., in those three years output from this source amounted to about 50,000 ounces. Following this and owing largely to the drop in price of copper, combined with high freight rates, there were practically no shipments of copper ores for several years. In 1930 the Hudson Bay Mining and Smelting Company commenced the production of blister copper and refined zinc at their new metallurgical plants at Flin Flon, these plants were in continuous operation throughout 1931.

BRITISH COLUMBIA

For some years, British Columbia has held first place among the silver, lead and zinc producing provinces of the Dominion. In this province, during 1931, 39 per cent of Canada's silver, 98 per cent of the lead, and 85 per cent of the zinc were produced. The Sullivan mine, owned by the Consolidated Mining and Smelting Company, is considered to contain one of the largest known lead and zinc ore deposits in the world. It is the greatest Canadian producer of lead, zinc and silver.

Low metal prices greatly affected the mining of silver-lead ores in British Columbia in 1931. In the Portland Canal section the B.C. Silver Mines suspended development work on May 15th, 1931. Operations at the Premier were practically continuous throughout the year; the property produced 1,718,376 ounces of silver in 1931 as compared with 2,760,787 in 1930. Both the Prosperity and Porter Idaho mines were closed in April owing largely to the low price of silver. It was reported that the crosscut tunnel at the Atlin Ruffner lead-silver mines, located in the Atlin Lake section, had intersected a vein structure about thirty feet wide with nine feet carrying about 12 per cent combined lead and zinc values and approximately 14 ounces silver per ton. Bell Mines, Ltd., in the Greenwood division, operated the Bell and Highland Lass continually throughout the year. The Bell has been in continuous operation since 1916; ore shipped by the company averaged 0.03 ounces gold; silver, 200 ounces per ton; lead, 6 per cent; zinc, 7 per cent. Total shipments in 1931 amounted to 1,800 tons. Others of the more important shippers to the Trail smelter included the Ruth Hope, Silversmith, Wellington, Planet and Ivanhoe. Total production for the year at the Sullivan mine amounted to 1,621,143 tons comprising 9,505 tons of crude lead ore shipped to Tadanac and 1,611,638 tons of lead-zinc ore to the concentrator at Kimberley. This is some 300,000 tons less than the previous year, the general reduction in tonnage was attained by working fewer days per month and retaining as nearly as possible a maximum crew. The average cost per ton of ore delivered at the concentrator bins was reduced approximately 16.3 per cent, and the average milling costs per ton approximately 8.8 per cent below the 1930 figures with a resultant reduction in the per pound cost of recoverable metal of 14.3 per cent; underground development, consistent with production, was maintained throughout the year. At the Monarch mine in the Golden mining division, the Base Metals Mining Corporation carried on operations during the early part of 1931 on both the east and west ore bodies; work later ceased; no ore was shipped during the year. At the silver-lead-zinc prospect of the Witwatersrand Syndicate located on McMurdo Creek in the same mining division, development work was conducted with a crew of sixteen men.

DISTRICT OF MACKENZIE

Deposits of lead ore situated about 32 miles southwest of Fort Resolution on Great Slave Lake were actively explored in 1929 by the Atlas Exploration Company. It is stated that the occurrences are of considerable economic importance and resemble to some extent those of the lead-zinc deposits in Missouri and other Mississippi valley states.

Exploration work was carried out by Eldorado Gold Mines Limited on its pitchblende silver deposits at Labine Point on the east side of Great Bear Lake. These were discovered in 1930 and represent the most important discoveries of high-grade native silver ores in Canada during recent years. The Consolidated Mining and Smelting Company reports that on their Echo Bay group, in the same area that the Eldorado veins occur, a very promising vein carrying native silver and argentite, associated with manganese, cobalt, copper and lead, has been exposed for a length of 420 feet. Many claims were staked in the district in 1931 and preparations made for extensive development and exploratory programs for 1932.

YUKON

Mayo is the principal silver-lead producing district in the Yukon. The Treadwell Yukon Company, operating Wernecke Mines in the Mayo district, states that most of the ore sent to the mill in 1931 came from the Lucky Queen mine. It is expected that the ore reserves of this property will be exhausted about August 1932 when it is intended to obtain ore from the Elsa and Silver King group; the mill operated 94.5 per cent of the possible time and treated 47,793 tons, the estimated operating profit for the year was \$271,151.

Table 51.—Shipments of Lead Ores and Concentrates from Canadian Mines, 1922-1931

(For years 1913 to 1921 see 1928 report on the Mineral Production of Canada)

Year	Shipment		Lead content in pounds	Silver content in ounces
	Tons	Value		
		\$		
1922.....	27,203	1,803,575	21,335,850	2,163,637
1923.....	76,886	4,692,755	66,770,926	3,745,129
1924.....	153,396	12,290,699	180,187,124	4,348,243
1925.....	208,588	15,420,756	237,675,311	6,024,213
1926.....	255,048	17,546,728	273,963,827	8,616,164
1927.....	275,328	13,044,514	308,903,620	8,831,840
1928.....	255,944	12,178,879	322,239,859	10,287,591
1929.....	258,203	15,990,117	328,877,236	10,177,926
1930*.....	259,630	11,024,912	336,976,074	10,172,485
1931*.....	193,370	5,678,421	253,963,266	8,502,392

* Shipments in 1930 contained 168,774 pounds of copper and 22,834,702 pounds of zinc. In 1931 shipments contained 6,190 pounds of copper and 18,098,829 pounds of zinc.

Table 52.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry, in Canada, 1930 and 1931

Production	*Quebec and Ontario	British Columbia	Yukon	Canada
	Tons	Tons	Tons	Tons
1930				
Ore mined.....	153,428	2,042,926	48,616	2,244,970
Ore milled.....	151,342	2,001,173	45,571	2,198,086
Concentrates produced—lead.....	2,455	226,939	4,210	233,604
Concentrates produced—zinc.....	6,092	235,852		241,944
Concentrates produced—copper.....	3,691			3,691
1931				
Ore mined.....	17,251	1,645,662	47,819	1,710,732
Ore milled.....	17,251	1,614,589	47,793	1,679,633
Concentrates produced—lead.....	316	174,506	4,208	179,030
Concentrates produced—zinc.....		200,099		200,099
Concentrates produced—copper.....				

* In 1930 includes 14,000 tons of ore mined, 11,914 tons of ore milled and 2,159 tons of concentrates produced in Nova Scotia but not shipped. In 1931 no silver-lead-zinc ores were mined in Quebec.

Table 53.—Products shipped by Silver-Lead-Zinc Mines in Canada, 1930 and 1931

Location of mines	No. of mines shipping	Products shipped	Quantity shipped	Net value at shipping point	Total metal content as determined by settlement assay				
					Gold	Silver	Lead	Zinc	Copper
			Tons	\$	Oz.	Oz.	Lb.	Lb.	Lb.
1930									
Yukon and Ontario.	7	Lead ore.....	2,743	388,298	109	775,075	2,405,129		
		Lead concentrates...	8,153	1,540,793	573	3,049,585	9,092,184		101,137
		Zinc concentrates...	4,714	8,532				4,282,134	
		Copper concentrates...	3,445	71,908	610	36,902			999,424
		Total.....	19,055	2,009,531	1,292	3,861,562	11,497,313	4,282,134	1,100,561
British Columbia...	37	Lead ore.....	21,706	544,332	1,186	1,181,357	9,916,064	1,113,877	
		Lead concentrates...	227,028	8,551,489	3,411	5,166,468	315,562,697	21,720,825	67,637
		Zinc ore.....	561	12,250	4	29,210	148,263	245,901	1,023
		Zinc concentrates*...	235,811	1,881,951	34	409,729	15,002,749	236,344,571	
		Dry ore.....	37	1,262	68	44			
		Total.....	485,143	10,991,284	4,703	6,786,808	340,629,773	259,425,174	68,660
Canada.....	44		504,198	13,000,815	5,995	10,643,370	352,127,086	263,707,305	1,169,221
1931									
British Columbia and Yukon.	16	Lead ore.....	14,621	315,462	605	995,424	6,614,700	976,835	6,190
		Lead concentrates...	178,723	5,361,759	363	7,505,317	247,348,566	17,121,994	
		Zinc ore.....	199,949	84,578		341,870	13,558,857	197,535,849	
		Zinc concentrates*...	383,858	588,976		4,412,839	265,369,134	215,122,663	
		Dry ore.....	26	1,200	63	1,651			
Canada.....	16		777,177	6,351,975	1,031	13,257,101	532,591,257	439,757,341	6,190

* In addition zinc concentrates were produced from copper-gold-silver-zinc ores see table 37.

Table 54.—Destination of Shipments from Silver-Lead-Zinc Mines in Canada, 1930 and 1931

Product shipped	Tons shipped	Net value at shipping point	Total metal content as determined by settlement assay				
			Gold	Silver	Lead	Zinc	Copper
		\$	oz.	oz.	pounds	pounds	pounds
1930							
To Canadian Smelters—							
Lead ore.....	17,949	472,086	1,105	888,687	9,764,629	1,113,877	
Lead concentrates.....	219,972	8,310,013	3,411	5,104,002	304,573,617	21,720,825	67,637
Zinc ore.....	561	12,250	4	29,210	148,263	245,901	1,023
Zinc concentrates*.....	224,806	1,828,533	34	409,729	15,002,749	223,214,713	
Dry ore.....	37	1,262	68	44			
Total.....	463,325	10,624,144	4,622	6,431,672	329,489,258	246,295,316	68,660
Lead ore.....	6,500	460,544	190	1,067,745	2,556,564		
Lead concentrates.....	15,209	1,782,269	573	3,112,051	20,081,264		101,137
Zinc ore.....						17,411,992	
Zinc concentrates.....	15,719	61,950					
Dry ore.....			610	36,902			999,424
Copper concentrates.....	3,445	71,908					
Total.....	40,873	2,376,671	1,373	4,216,698	22,637,828	17,411,992	1,100,561
1931							
Lead ore.....	13,258	203,869	555	677,809	6,009,765	976,835	6,190
Lead concentrates.....	174,574	4,135,000	118	3,981,701	243,264,435	17,121,994	
Zinc ore.....	199,949	84,578		341,870	13,558,857	197,535,849	
Zinc concentrates*.....	383,858	589,976		4,412,839	265,369,134	215,122,663	
Dry ore.....	26	1,200	63	1,651			
Total.....	771,665	5,013,623	736	9,415,870	528,202,191	430,757,341	6,190
Lead ore.....	1,363	111,593	50	317,615	604,935		
Lead concentrates.....	4,149	1,226,759	245	3,523,616	4,084,131		
Zinc ore.....							
Zinc concentrates.....							
Dry ore.....							
Copper concentrates.....							
Total.....	5,512	1,338,352	295	3,841,231	4,689,066		

* Does not include zinc concentrates produced from copper-gold-zinc ores in Manitoba or Quebec.

Table 55.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1930 and 1931

Province	Capital employed as represented by				
	Present value of buildings, fixtures, machinery, tools, equipment, etc.	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$
1930					
Nova Scotia and Quebec.....	4,559,026	91,101		82,744	4,732,871
Ontario.....	7,198,379	104,867		108,731	7,411,977
British Columbia.....	24,539,305	1,310,081		682,924	26,532,310
Yukon.....	2,596,907	657,407		122,202	3,376,516
Canada.....	38,893,617	2,163,456		995,601	42,053,674
1931					
Nova Scotia and Yukon.....	2,197,600	293,954	305,027	235,240	3,031,821
Quebec.....	3,187,158	27,300		10,000	3,224,458
Ontario.....	7,786,453	91,925		83,079	7,961,457
British Columbia.....	14,856,058	1,731,720	3,500	343,064	16,931,342
Canada.....	28,027,269	2,144,899	308,527	671,383	31,152,078

Table 56.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1930 and 1931

Province	1930						1931					
	On salary	Mine		Mill	Total	Salaries and wages	On salary	Mine		Mill	Total	Salaries and wages
		Surface	Under-ground					Surface	Under-ground			
Nova Scotia and Quebec.....	17	123	94	19	253	\$ 262,476	.....	.....	.....	.....	.....	.....
Nova Scotia and Yukon.....	.....	.....	.....	.....	.....	.....	18	63	39	12	132	347,602
Quebec.....	.....	.....	.....	.....	.....	.....	5	15	5	.....	25	31,982
Ontario.....	33	53	161	31	278	484,819	18	28	52	6	104	174,752
British Columbia.....	176	572	1,028	397	2,173	3,071,936	116	236	433	253	1,038	1,595,585
Yukon.....	12	62	76	12	162	444,730	.....	.....	.....	.....	.....	.....
Canada.....	238	810	1,359	459	2,866	4,263,961	157	342	529	271	1,299	2,149,921

4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc

ARSENIC

Arsenic bearing minerals or ores are rather widespread in Canada. Nova Scotia has, in the past, produced arsenic bearing concentrates in the milling of auriferous quartz ores; at the present time the Canadian production comes from the treatment of the cobalt-silver ores of northern Ontario. In British Columbia auriferous arsenical concentrates were exported for some years by the Hedley Gold Mining Company for reduction in a Tacoma smelter. The Canadian production of arsenic in 1931 was recovered as a by-product by the Deloro Smelting and Refining Company, Deloro, Ontario.

Arsenic is utilized for various purposes; as an insecticide it is one of the principal constituents of Paris green and of lead and calcium arsenates; it is also employed as sodium arsenite for weed killing. Other uses include its adoption in the manufacture of certain glasses, cattle and sheep dips, paints, tanning supplies, wood preservatives and pharmaceutical preparations.

The United States and Mexico recover probably more than two-thirds of all the arsenic produced annually in the world and this, together with imports from other countries, is consumed in the United States. Since 1929 the average price of arsenious oxide (white arsenic) has ranged from four to five cents per pound.

Table 57.—Production of Arsenic in Canada, 1922-1931

(For production from 1885-1921, see Annual Report Mineral Production 1928)

Year	Arsenic in ore		White arsenic		Year	Arsenic in ore		White arsenic	
	tons	\$	tons	\$		tons	\$	tons	\$
1922.....	518	21,097	2,058	299,940	1927.....	667	15,644	2,447	196,335
1923.....	631	44,030	2,579	582,785	1928.....	708	16,539	2,008	176,513
1924.....	513	39,185	1,798	309,108	1929.....	766	17,314	1,849	154,006
1925.....	714	21,513	1,003	108,789	1930.....	1,011	34,523	1,250	95,004
1926.....	545	12,687	1,992	134,124	1931.....	.....	.....	1,787	135,170

Table 58.—Production (As₂O₃), Exports and Imports of Arsenic, for Canada, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
PRODUCTION—		\$		\$		\$
From arsenical concentrates exported.. lb.	1,531,218	17,314	1,773,540	19,599	.....	.....
White arsenic and arsenic in other forms lb.	3,698,870	154,006	2,750,680	109,928	3,575,936	135,170
Total..... lb.	5,230,088	171,320	4,524,220	129,527	3,575,936	135,170
EXPORTS—						
Arsenic, As ₂ O ₃ lb.	3,167,300	123,398	2,335,600	86,825	3,092,500	116,044
IMPORTS—						
White arsenic..... lb.	123,224	5,341	12,160	749	167,015	5,824
Sulphide of arsenic..... lb.	18,295	1,865	25,113	2,208	10,412	1,347
Arseniate of soda..... lb.	1,456	156	2,968	350	704	202
Arsenate of lead..... lb.	846,017	98,179	1,069,383	112,768	1,248,460	116,996
Calcium arsenate..... lb.	446,835	23,598	655,619	36,211	821,509	42,107

Table 59.—World Production of Arsenic, 1929-1931

(Long tons)
(Supplied by Imperial Institute)

Country and Product	1929	1930	1931	Country and Product	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom—				Germany—			
Arsenical pyrites.....	20			Ore (arsenic content).....	1,728	1,829	1,821
White arsenic and arsenic				White arsenic (exports)....	2,537	4,541	4,355
soot.....	953	579	177	Greece—			
Southern Rhodesia—				White arsenic.....	751	828	649
White arsenic.....	51	49		Jugoslavia—			
Union of South Africa—				Ore.....		7	
White arsenic.....	33	15	9	Portugal—			
Canada—(Sales)—				Ore.....	123		156
Gold concentrates (As ₂ O ₃				Sweden—			
content).....	684	903		Ore (arsenic content).....	4,512	4,281	11,005
White arsenic.....	1,651	1,116	1,596	Algeria—			
Federated Malay States—				Arsenate of lead (arsenic			
Arsenic.....	304	225	133	content).....	750	347	(a)
Australia—				Mexico—			
White arsenic.....	251	796	1,070	White arsenic, etc. (arsenic			
				content).....	9,512	9,819	6,406
FOREIGN COUNTRIES				United States—			
Belgium (exports)—				White arsenic.....	14,286	15,229	15,301
White arsenic.....	3,658	3,062	2,462	China—			
Czechoslovakia—				White arsenic.....	2,349	967	500
Arsenical pyrites.....	14	2		Japan—			
France—				White arsenic.....	1,932	1,627	2,547
Ore (arsenic content).....	4,163	5,060	(a)	Turkey—			
White arsenic.....	3,319	3,800	(a)	Arsenic ore.....	6	22	22

(a) Information not available.

NOTE.—About 5,000 tons of ore were recorded as produced in Russia during 1927—later figures are not available.

COBALT

Canadian cobalt production in 1931 includes the cobalt content of the various cobalt products sold by the Deloro Smelting and Refining Company, Deloro, Ontario, and the cobalt content of all ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Canada's production of cobalt which amounted to 521,051 pounds in 1931, decreased sharply from that of the preceding year. This was largely due to the continued adverse industrial conditions prevailing throughout the world since 1929. Competition from the Belgian Congo ores of the Union Minière du Haut Katanga has been increasing rapidly, the cobalt production of this company has now considerably surpassed the Canadian output and in 1930 totalled 1,568,000 pounds.

Following the discovery of the cobalt camp in 1903, and until quite recently, the greater part of the world's supply of cobalt was derived from the treatment of ores mined in that area. Two companies, the Coniagas Reduction Company of Thorold, Ontario (closed since 1926), and the Deloro Smelting and Refining Company, Limited, Deloro, Ontario, developed processes for the recovery of cobalt from these ores. (For a description of smelter practice see 1929 mineral production of Canada).

In 1922 the average price of \$3.25 per pound was used in computing the annual production value; \$2.85 was the price used for 1923 and from 1924 to date the values given in the report have been based on returns actually received by the operators. In 1931 the market quotations for cobalt were: metal, \$2.50 per pound; cobalt oxide, \$1.75 per pound.

A bounty of six cents a pound on the metallic content of cobalt and nickel oxides was paid by the Ontario government from 1907 to 1917.

The results of almost continuous research on cobalt during recent years are apparent in the many growing and diversified uses for this metal; its oxides are utilized as pigments in the manufacture of earthenware; cobalt salts are employed as driers in the paint and varnish industry, and the alloys exhibit a wide range of usefulness including their adoption as filaments in radio tubes, motor valves, abrasion resisters, steam turbine blades, cutting tools and various other applications, especially where stress resistance under extreme temperatures is a necessary factor.

It is interesting to observe that the cobalt ores of the Belgian Congo are now being smelted in Africa to form a cobalt-copper-iron alloy which is shipped to Belgium for further metallurgical treatment.

A summary of the cobalt production from 1922 is shown in the following table. The quantities given are the cobalt content of all smelter products sold or shipped, such as cobalt metal, the oxides, mixed oxides, residues, etc.

Table 60.—Production of Cobalt from Canadian Ores, 1922-1931

Year	Pounds	Year	Pounds
1922.....	616,088	1927.....	880,590
1923.....	760,105	1928.....	956,590
1924.....	948,704	1929.....	929,415
1925.....	1,116,492	1930.....	694,163
1926.....	664,778	1931.....	521,051

NOTE.—For years 1904 to 1921 see previous reports.

Table 61.—Production in Canada and Exports of Cobalt, 1929-1931

	1929		1930		1931	
	Pounds	\$	Pounds	\$	Pounds	\$
PRODUCTION—						
Cobalt, computed as cobalt in metal, oxides and salts sold, and in ores and residues exported.....	929,415	1,801,915	694,163	1,144,007	521,051	651,179
EXPORTS—						
Cobalt alloys, cobalt metallics, cobalt oxides, cobalt salts and cobalt ores.....		1,786,163		1,319,870		735,225

Table 62.—World Production of Cobalt, 1929-1931

(Supplied by Imperial Institute)

Country	1929	1930	1931
BRITISH EMPIRE	pounds	pounds	pounds
Union of South Africa (ore).....	336		
Canada (c).....	929,415	694,163	521,024
India (b).....	246,400	246,400	224,000
Australia (metal).....	44,800	7,840	
FOREIGN COUNTRIES			
Belgian Congo (metal and oxide).....	1,560,832	1,568,000	815,360

NOTE.—Complex ores containing cobalt are also found in Germany and China, but cobalt content is not available.

(b) Estimated cobalt content of nickel-speiss exported to Hamburg.

(c) Metal recovered from smelter products and including cobalt contained in cobalt residues exported.

SILVER

A small quantity of silver was recovered during 1931 from crude gold bullion produced in Nova Scotia; in Quebec the silver output in 1931 came entirely from the metal recovered from auriferous quartz ores, Noranda blister copper, and copper concentrates shipped by the Consolidated Copper and Sulphur Company, Ltd.

Ontario produced 7,438,951 ounces, 82 per cent of which was in the form of bullion made from cobaltiferous ores; the balance was contained in concentrates exported, in gold bullion produced at gold mines, in nickel-copper ores mined in the Sudbury district and in gold, silver or copper ores shipped to the Noranda and Trail smelters.

Manitoba's silver production came from gold bullion produced from auriferous quartz ores and from blister copper made at the Flin Flon smelter; the output for 1931 showed a substantial gain over that for 1930 owing to continuous copper smelting operations by the Hudson Bay Mining and Smelting Company, Ltd., at the new Flin Flon plants.

An output of 8,061,599 fine ounces of silver in British Columbia during 1931 was considerably less than the 1930 high production record for this metal. The principal silver producing mines were the Sullivan, Premier, Prosperity, Bell and Porter Idaho; small recoveries were made in the refining of bullion produced in alluvial and auriferous quartz mining. Silver contained in copper ores and concentrates exported to foreign smelters and in blister copper made at the Granby smelter contributed considerably to the total silver production.

The Yukon production of 3,694,728 fine ounces was slightly less than that of 1930. Silver recovered as a by-product in alluvial gold operations was greater than the previous year and the decrease in the total output of the Territory was accounted for through lessened exports of silver-lead concentrates.

Producers of both silver-lead and cobalt-silver ores in Canada during 1931 suffered considerably through the almost unprecedented decline in the price of metals and in some instances it was only by efficient mining, low costs and the ability to recover and market the combined or some of the associated metals that continuity of mining operations was possible.

Suggestions have been advanced for an international conference to investigate the silver situation. It has also been advocated to re-establish silver on a monetary basis and to stimulate its use in the arts and industries.

Table 63.—Production of Silver in Canada, by Provinces and by Sources, 1930 and 1931

	1930		1931	
	Quantity	Value	Quantity	Value
	Fine ounces	\$	Fine ounces	\$
NOVA SCOTIA—				
In gold bullion.....	67	26	48	14
QUEBEC—				
In gold ores, in blister copper and in copper ores exported.....	571,164	217,922	530,345	158,414
ONTARIO—				
In silver bullion and nuggets.....	8,159,811	3,113,294	6,100,055	1,822,086
In gold bullion.....	294,135	112,224	357,311	106,729
In slags exported from gold mines.....	5,545	2,116	6,414	1,916
In matte, blister copper and in ores, concentrates and residues exported†.....	1,746,192	666,242	975,171	291,283
Total.....	10,205,683	3,893,876	7,438,951	2,222,014
MANITOBA—				
In gold bullion and blister copper.....	94,653	36,114	836,547	249,877
ALBERTA in alluvial gold.....			29	9
BRITISH COLUMBIA—				
In alluvial gold.....	1,612	615	3,091	923
In gold bullion.....	2,593	989	6,843	2,044
In blister copper.....	1,101,045	420,093	820,715	245,148
In base bullion and in matte and ores exported.....	10,720,680	4,090,368	7,230,950	2,159,885
Total.....	11,825,930	4,512,065	8,061,599	2,408,000
YUKON—				
In alluvial gold.....	7,911	3,018	9,914	2,961
In ores exported.....	3,738,415	1,426,355	3,684,814	1,100,654
Total.....	3,746,326	1,429,373	3,694,728	1,103,615
Canada.....	26,443,823	10,089,376	20,562,247	6,141,943

† Includes silver produced in Ontario and Quebec from blister copper made from Ontario ores.

Table 64.—Production of Silver in Canada, 1922-1931

Year	Fine ounces	Value	Cents per ounce	Year	Fine ounces	Value	Cents per ounce
1922.....	18,626,439	12,576,758	67.521	1927.....	22,736,698	12,816,677	56.370
1923.....	18,601,744	12,067,509	64.873	1928.....	21,936,407	12,761,725	58.176
1924.....	19,736,323	13,180,113	66.781	1929.....	23,143,261	12,264,308	52.993
1925.....	20,228,988	13,971,150	69.065	1930.....	26,443,823	10,089,376	38.154
1926.....	22,371,924	13,894,531	62.107	*1931.....	20,562,247	6,141,943	29.87

*See footnote Table 65.

NOTE.—For years 1887 to 1921 see previous reports.

Table 65.—Production of Silver from Canadian Ores,* by Provinces, 1922-1931

(For the years 1887 to 1921 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		Manitoba		British Columbia		Yukon Territory	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
		\$		\$		\$		\$		\$
1922.....			10,811,903	7,300,305	20	14	7,150,937	4,828,384	663,493	447,997
1923.....	33,006	21,412	10,540,943	6,838,226	5	3	6,113,327	3,965,899	1,914,438	1,241,953
1924.....	83,814	55,972	11,272,567	7,527,933	140	93	8,163,003	5,444,657	226,755	151,429
1925.....	214,943	148,451	10,529,131	7,271,944	477	329	8,579,458	5,925,403	904,893	624,964
1926.....	375,986	233,513	9,274,965	5,760,402	18	11	10,625,816	6,599,376	2,095,027	1,301,159
1927.....	740,864	417,625	9,307,953	5,246,893	12	7	11,040,445	6,223,499	1,647,295	928,580
1928.....	908,959	528,796	7,242,601	4,213,456	1,763	1,026	10,943,367	6,366,413	2,839,633	1,651,985
1929.....	813,821	431,268	8,890,726	4,711,462	2,644	1,401	10,156,408	5,382,185	3,279,530	1,737,922
1930.....	571,164	217,922	10,205,683	3,893,876	94,653	36,114	11,825,930	4,512,065	3,746,326	1,429,373
1931.....	530,345	158,414	7,438,951	2,222,014	836,547	249,877	8,061,599	2,408,000	2,694,728	1,103,615

*Does not include comparatively small productions from Nova Scotia and Alberta.

Table 66.—Silver in Mine Shipments from Cobalt District and Nearby Camps in Ontario, 1922-1931

(From 1931 Report of Ontario Department of Mines.)

Year	Silver shipments in Troy ounces				
	Cobalt area	Casey township	South Lorrain	Gowganda	Others including Montreal River and Maple Mountain
1922.....	9,239,147	1,028	1,284,307	170,651	15,994†
1923.....	7,259,858		2,955,646	160,761	1,581
1924.....	6,704,787		2,633,058	598,057	
1925.....	6,252,115		3,099,964	1,355,156	
1926.....	6,262,249		3,044,584	1,236,640	
1927.....	4,482,543		2,319,356	1,741,614	
1928.....	3,934,020		1,133,952	1,677,429	
1929.....	4,823,529		876,006	2,081,894	
1930.....	5,329,335		1,754,989	2,141,234 (a)	52
1931.....	3,706,880		594,360	1,697,242	

†Silver Islet, exclusively.

(a) Nickel Hill Syndicate in the Sudbury area shipped a silver-cobalt ore.

NOTE.—For years 1904 to 1921 see previous reports.

Table 67.—Imports into Canada and Exports of Silver, 1929-1931

	1929		1930		1931	
	Fine ounces	\$	Fine ounces	\$	Fine ounces	\$
IMPORTS—						
Silver in bars, blocks, ingots, drops, sheets or plates unmanufactured.....		958,312		610,634		467,404
Silver, manufactures of n.o.p. and articles consisting wholly or in part of sterling or other silverware.....		400,125		199,123		115,127
Silver and other coin, foreign, except gold.....						260
Total.....		1,358,437		809,757		582,791
EXPORTS—						
Silver contained in ore, concentrates, etc.....	7,058,275	3,736,204	8,473,189	3,401,340	4,017,182	1,168,261
Silver bullion.....	14,879,770	8,022,917	15,778,755	6,180,412	14,649,185	4,230,998
Total.....	21,938,045	11,759,121	24,251,944	9,581,752	18,666,367	5,399,259
Silver coin—Foreign.....		2,603,704		2,417,822		3,447,323
“ “ Canadian.....		83		30		17,461

Table 68.—Monthly Average Prices of Silver, 1929-1931

(From the *Engineering and Mining Journal*)

Month	New York (Cents per fine ounce)			London (Pence per standard ounce)		
	1929	1930	1931	1929	1930	1931
January.....	57-019	45-000	29-423	26-257	20-896	13-810
February.....	56-210	43-193	26-773	25-904	20-008	12-432
March.....	56-346	41-654	29-192	26-000	19-298	13-524
April.....	55-668	42-428	28-279	25-738	19-554	13-120
May.....	54-125	40-736	27-650	25-084	18-850	12-858
June.....	52-415	34-595	27-250	24-258	16-049	12-707
July.....	52-510	34-346	28-255	24-289	15-928	13-197
August.....	52-579	35-192	27-524	24-288	16-283	12-815
September.....	51-042	36-315	18-180	23-708	16-738	14-101
October.....	49-913	35-846	29-638	23-042	16-563	17-153
November.....	49-615	35-908	32-223	22-690	16-625	19-393
December.....	48-475	32-635	30-120	22-258	15-201	20-023
Average.....	52-993	38-154	28-700	24-460	17-666	14-594

Using the par of exchange in New York for the first 9 months of 1931 and the average monthly rate of exchange for each of the last three months, the average value of silver in Canadian funds for the year was 29-87 cents per fine ounce.

World Production.—In order of importance, the principal silver producing countries of the world are: Mexico, the United States, Canada and Peru. The total world output for 1931, as computed by the American Bureau of Metal Statistics, was 195,575,000 fine ounces as against 247,222,102 in 1930.

Table 69.—Comparative Figures of Silver Production, for the World, Mexico, United States, Peru and Canada, 1922-1931

Year	World's Output*	Mexico's Output*	United States Output*	Peru's Output*	Canada's Output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1922.....	209,815,448	81,076,899	56,212,054	13,169,765	18,626,439
1923.....	246,009,534	90,859,083	73,295,810	18,654,793	18,601,744
1924.....	239,484,703	91,486,136	65,366,840	18,717,087	19,736,323
1925.....	245,213,993	92,885,465	66,106,922	19,917,439	20,228,988
1926.....	253,795,166	98,291,166	62,672,953	21,499,798	22,371,924
1927.....	251,096,555	104,573,919	60,394,199	18,295,408	22,736,698
1928.....	257,925,154	108,537,307	58,426,004	21,607,693	21,936,407
1929.....	260,970,029	108,871,442	61,233,321	21,495,169	23,143,261
1930†.....	247,000,000	105,204,059	47,724,903	14,372,593	26,443,823
1931.....	194,000,000	86,064,457	30,828,046	11,048,000	20,562,247

*From Annual report of the "Director of the Mint", Washington.

†1930 and 1931 figures from the *Imperial Institute*.

NOTE.—For years 1898 to 1921 see previous reports.

Table 70.—World Production of Silver Ore, 1929-1931

(In terms of metal)

(Supplied by Imperial Institute)

(Fine ounces)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES— Concluded			
United Kingdom.....	35,989	40,955	33,989	Sweden.....	145,736	191,260	362,491
Bechuanaland Protec- torate (c).....	182	434	1,362	Algeria.....	130,625	129,042	258
Gold Coast (estimated).....	7,500	8,200	8,900	Morocco (French zone).....	52,000	64,000	(a)
Kenya.....	131	155	288	Mozambique.....	54	38	(a)
Nigeria (estimated).....	6,400	50,500	251,855	Tunis.....	99,000	92,000	(a)
Northern Rhodesia.....	2,249	637	548	Mexico.....	108,700,372	105,204,059	86,064,457
Southern Rhodesia.....	87,233	72,720	75,960	United States.....	60,860,011	47,724,903	30,828,046
South West Africa (b).....	892,000	1,093,000	639,000	Costa Rica (c).....	1,117		300
Tanganyika Territory.....	1,027	1,278	(a)	Honduras.....	2,466,095	2,957,093	(a)
Union of South Africa.....	1,031,779	1,050,038	1,063,050	Nicaragua.....	43,298	38,103	36,485
Canada.....	23,143,261	26,443,823	20,562,247	Panama (c).....	301,365	(c)	2,800
British Guiana (esti- mated).....	820	780	1,340	Argentina (b).....	15,000	15,000	15,000
India.....	7,298,327	7,072,050	5,923,005	Bolivia (exports).....	6,214,531	7,091,000	5,772,307
Federated Malay States (estimated).....	2,360	2,600	2,600	Brazil (b).....	21,026	20,000	10,000
Australia.....	10,071,069	10,075,002	6,730,227	Chile.....	1,570,293	760,465	372,361
New Zealand (b).....	415,706	565,860	434,822	Colombia.....	52,269	(b) 60,000	(b) 40,000
Total.....	43,000,000	46,300,000	35,700,000	Ecuador (b).....	96,511	106,127	104,762
FOREIGN COUNTRIES				Guiana (French and Dutch) (b).....	7,500	7,500	6,000
Austria.....	38,387	30,446	82,626	Peru.....	21,675,755	14,372,593	11,048,000
Czechoslovakia.....	1,302,274	1,469,004	1,231,778	Venezuela (b).....	4,000	4,000	4,000
France.....	541,695	652,000	(a)	China.....	116,000	145,000	186,000
Germany.....	5,512,664	5,485,433	5,784,589	Formosa.....	11,796	15,162	12,000
Greece.....	171,130	264,607	132,081	French Indo-China.....	3,167	3,900	(a)
Italy.....	598,717	506,301	442,000	Japan.....	5,163,434	5,628,306	5,586,551
Jugoslavia.....	80,000	77,000	80,000	Korea.....	54,724	(b) 68,756	65,000
Norway.....	281,865	401,334	312,104	Netherlands East In- dies.....	1,991,127	2,094,261	(a)
Poland.....	376,702	561,191	365,104	Turkey.....	(b) 220,000	(b) 220,000	155,457
Roumania.....	90,727	142,039	114,261	Philippine Islands.....	101,480	110,278	97,097
Spain.....	2,659,223	2,819,169	3,098,713	Total.....	222,000,000	197,000,000	158,000,000
				World's Total.....	255,000,000	247,000,000	194,000,000

(a) Information not available.

(b) Silver content of exports, including jewellers' sweepings.

(c) Years ended February 28 of the year following that stated.

(d) Years ended March 31st of the year following that stated.

NOTE.—623,389 fine ounces of silver were recorded as produced in Russia during year ended September, 1928—later figures are not available.

LEAD

CANADA.

Canada's lead production includes (a) lead contained in ores and concentrates exported less deductions for smelter losses, valued at the average price in London for the year; (b) the lead contained in the base bullion made by the Consolidated Mining and Smelting Company, Ltd., at Trail, B.C., and the lead in a silver-lead-bismuth bullion produced at the Deloro smelter in Ontario, valued at the average price in London for the year, and (c) the pig lead made by the Kingdon Mining, Smelting and Manufacturing Company at Galetta, Ontario, at its sales value.

Production in 1931 included lead from the Kingdon and O'Brien mines in Ontario, from the Sullivan mine in East Kootenay, British Columbia, and from several other properties producing in the Slocan, Portland canal and other districts of the same province. Important quantities of lead were contained in silver-lead concentrates exported from the Yukon by the Treadwell-Yukon Mining Company.

Previous to 1904, lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces to a base bullion which was exported for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C., since 1904; this refinery treats the product from the Consolidated Mining and Smelting Company's blast furnaces. The greatest advance in 1931 at Trail was made in the lead smelting plant through the operation of the new slag fuming installation. This plant has produced and can continue to produce 23 per cent more zinc and 4 per cent more lead from the same ore than was formerly possible.

A Canadian lead production of 267,342,482 pounds in 1931 represents a 20 per cent decrease in quantity from that for the previous year. This resulted from the exceptionally low prices for the metal, and international industrial depression.

Important quantities of lead are consumed in the storage battery, cable and pigments industries; The American Bureau of Metal Statistics shows the use of lead in the United States in 1931 by percentages as follows: cable covering, 20·61 per cent; storage batteries, 27·66 per cent; white lead, 13·65 per cent; building, 7·05 per cent; ammunition, 5·23 per cent; red lead and litharge, 3·17 per cent; and the balance in solder, bearing metals; etc.

Metallgesellschaft estimated that the world smelter production of lead fell from 1,650,381 metric tons in 1930 to 1,381,801 tons in 1931, a decrease of approximately 16 per cent. There was a diminishing demand among the lead consuming industries during the year; the building trades were depressed and manufacturers of cables, storage batteries, lead paints, etc., all curtailed their purchases of the metal.

Table 71.—Production* of Lead from Canadian Ores, 1922-1931

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1922.....	93,307,171	5,817,702	1927.....	311,423,161	16,477,139
1923.....	111,234,466	7,985,522	1928.....	337,946,688	15,553,231
1924.....	175,485,499	14,221,345	1929.....	326,522,566	16,544,248
1925.....	253,590,578	23,127,460	1930.....	332,894,163	13,102,635
1926.....	283,801,265	19,240,661	1931.....	267,342,482	7,260,183

*The data given represent the quantity of lead produced in Canada from domestic ores, together with the estimated lead recovery from lead ores and concentrates exported.

NOTE.—For years 1887 to 1921 see previous reports.

Table 72.—Production of Lead from Canadian Ores, by Provinces, 1922-1931

(For years 1887 to 1921 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		British Columbia		Yukon	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
1922.....			2,890,397	180,216	87,093,266	5,430,265	3,323,508	207,221
1923.....	520,041	37,334	4,401,494	315,983	99,541,818	7,146,107	6,771,113	486,098
1924.....	1,058,983	85,820	5,055,368	409,687	168,467,628	13,652,617	903,520	73,221
1925.....	2,051,100	187,060	7,209,534	657,510	242,454,502	22,111,850	1,875,442	171,040
1926.....	3,729,636	251,788	7,398,795	580,730	266,812,461	18,012,509	5,860,373	395,634
1927.....	6,496,577	341,461	7,990,709	528,729	292,770,544	15,388,020	4,165,331	218,929
1928.....	6,218,336	284,520	6,814,757	402,289	317,722,146	14,537,377	7,191,449	329,045
1929.....	5,358,304	270,616	4,769,506	294,431	307,999,153	15,555,189	8,395,603	424,012
1930.....			2,193,856	116,034	321,803,725	12,637,232	8,896,582	349,369
1931.....			985,633	41,647	261,902,236	7,097,812	4,454,613	120,724

Table 73.—Refined Lead Produced in Canada,* 1922-1931

Year	Pounds of refined lead produced	Year	Pounds of refined lead produced
1922.....	81,412,716	1927.....	295,766,327
1923.....	101,096,312	1928.....	301,067,819
1924.....	130,471,208	1929.....	304,449,673
1925.....	213,217,605	1930.....	304,471,706
1926.....	257,273,585	1931.....	278,448,457

* Includes the electrolytic lead produced from Canadian and foreign ores at Trail, B.C., and also the pig lead from Galetta, Ont.

NOTE.—For years 1904 to 1921 see previous reports.

Table 74.—Imports into Canada and Exports of Lead, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
IMPORTS—						
Old and scrap, pig and block.....	1,173,481	68,787	764,305	32,029	256,978	8,749
Bars and sheets.....	260,862	16,437	1,521,359	95,738	539,054	24,535
Litharge.....	5,592,200	423,261	2,865,600	213,240	3,866,100	232,280
Acetate of lead not ground.....	110,275	10,206	172,387	16,496	102,955	9,146
Nitrate of lead not ground.....	305,321	22,246	150,904	10,066	102,461	6,183
Other manufactures, n.o.p.....		293,629		244,270		162,436
Pipe lead.....	59,874	5,138	369,082	23,067	127,525	5,750
Shots and bullets.....	13,434	1,474	9,043	907	8,699	5,791
Tea lead.....	13,480	1,350	17,920	1,430	17,780	1,275
Lead pigments—						
Dry white lead.....	67,585	6,297	47,287	4,099	95,470	7,084
White lead, ground in oil.....	236,093	19,538	58,662	5,894	53,119	4,736
Dry red lead and orange mineral....	1,791,872	134,685	1,352,076	110,075	1,491,320	98,103
Total.....		1,003,048		757,366		561,068
EXPORTS—						
Lead in ore.....	15,976,800	1,047,441	26,323,200	1,258,272	4,421,700	176,964
Lead in pigs, refined lead, etc.....	228,374,100	10,053,402	205,432,600	7,015,308	216,425,800	4,482,812
Total.....	244,350,900	11,100,843	231,755,800	8,273,580	220,847,500	4,659,776

Table 75.—Monthly Average Prices of Pig Lead, Montreal,* New York and London,† 1929-1931

Month	Montreal (Value in cents per pound)			New York (Value in cents per pound)			London† (Value in pounds sterling per long ton)		
	1929	1930	1931	1929	1930	1931	1929	1930	1931
January.....	6.43	6.50	4.640	6.650	6.250	4.802	22.111	21.545	13.872
February.....	6.58	6.42	4.530	6.853	6.236	4.552	23.128	21.188	13.444
March.....	7.17	5.95	4.510	7.450	5.662	4.527	25.409	18.807	13.128
April.....	7.08	5.65	4.250	7.187	5.537	4.412	24.783	18.319	12.375
May.....	6.74	5.33	3.930	7.000	5.523	3.818	23.949	17.795	11.491
June.....	6.70	5.36	3.920	7.000	5.410	3.917	23.694	17.941	11.582
July.....	6.55	5.36	4.135	6.804	5.250	4.400	22.810	18.160	12.731
August.....	6.60	5.40	3.964	6.750	5.488	4.400	23.185	18.294	11.944
September.....	6.67	5.32	3.800	6.890	5.500	4.400	23.557	17.909	11.932
October.....	6.62	4.82	3.905	6.873	5.151	3.964	23.226	15.747	13.227
November.....	6.48	4.91	4.162	6.285	5.100	3.937	21.622	15.954	14.577
December.....	6.50	4.93	4.268	6.250	5.100	3.792	21.472	15.283	15.188
Average.....	6.67	5.49	4.168	6.833	5.517	4.243	23.246	18.077	12.958

*Producers' prices for car load quantities ex-cars Montreal, as furnished by the Consolidated Mining and Smelting Company.

† From the *Engineering and Mining Journal*.

‡ Computed at par \$4.8666, the London price of lead in 1929—5.050 cents per pound. Transposed into Canadian funds at par the average value of lead in 1930 was 3.927 cents per pound. In 1931 using the par of exchange in London for the first 9 months and the average monthly rate of exchange for each of the remaining three months the average value of lead for the year in Canadian funds was 2.7101 cents per pound.

CONSUMPTION OF LEAD IN CANADA, 1930 AND 1931

The apparent consumption of metallic lead in Canada during 1931 amounted to 50,020,000 pounds as compared with 60,285,000 pounds in 1930. These estimates were based on the following data:—Canadian smelter sales of refined or metallic lead in 1931 totalled 265,650,000 pounds; exports of pig lead, 216,426,000 pounds; imports of lead pigs and blocks, 256,000 pounds; imports of lead bars and sheets, 540,000 pounds. Smelter sales of refined or metallic lead in 1930 amounted to 263,443,000 pounds; exports of lead pigs and blocks, 205,433,000 pounds; imports of pig, block, bars and sheets, 2,275,000 pounds. Census of Industry surveys conducted by the Bureau during 1930 give the metallic lead consumptions in the major Canadian lead consuming industries as: paints and pigments, 18,339,000 pounds; alloys (white metals) 18,279,000 pounds; iron and steel industries, 1,106,000 pounds; electrical industry, 25,499,000 pounds. In 1931 the consumption for these same industrial groups were recorded as follows: paints and pigments, 14,581,824 pounds; alloys (white metals), 12,395,196 pounds; iron and

steel industries, 773,314 pounds; electrical industry, 15,292,415 pounds. The differences between the quantities of lead as shown under apparent consumption and amounts credited to the individual industries are to be accounted for either by annual (inventory) carry overs, scrap consumption, or assimilation of metal by consumers not included in the industrial groups in this survey.

Table 76.—World Production of Lead Ore, 1929-1931

(In terms of metal)
(Supplied by *Imperial Institute*)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	18,608	20,304	23,602	—Con.			
Kenya.....	2			Norway.....	32	639	867
Nigeria.....	50	370	1,310	Poland.....	11,400	11,300	8,000
N. Rhodesia (smelter).....	1,635			Portugal.....	150		40
S. Rhodesia.....		4		Roumania (smelter).....	556	969	1,293
S. W. Africa (b).....	25,500	28,500	14,100	Russia (smelter).....	8,300	10,580	11,000
Union of S. Africa.....	50	6	39	Spain (smelters).....	140,498	121,317	107,899
Canada.....	145,769	148,613	119,349	Spitzbergen.....	48	77	(a)
Newfoundland				Sweden.....	6,925	5,835	8,237
(estimated).....	11,000	12,000	17,000	Algeria.....	8,852	7,686	208
India.....	102,100	114,400	89,000	Egypt.....	134	70	
Australia.....	194,006	197,595	150,764	Morocco (French).....	3,500	4,100	4,000
Total.....	500,000	520,000	420,000	Tunis.....	17,000	14,000	13,000
FOREIGN COUNTRIES				Mexico (b).....	244,478	229,252	223,199
Austria.....	7,388	8,754	1,646	United States (b)..... (c)	578,567	499,063	361,270
Bulgaria (estimated).....	3,600	1,200		Argentina.....	2,887	2,908	3,738
Czechoslovakia.....	4,411	6,500	4,604	Bolivia (exports).....	14,719	11,826	6,564
Finland.....	268	180	(a)	Chile.....	1,615	664	(a)
France.....	11,058	10,400	10,000	Peru.....	27,819	(a)	(a)
Germany.....	59,509	67,579	53,404	China (estimated).....	6,900	4,900	3,800
Greece.....	4,161	7,686	6,043	French Indo-China.....	51	20	6
Italy.....	30,051	29,445	24,185	Japan (smelter).....	3,321	3,524	4,000
Jugoslavia.....	14,500	19,800	40,200	Korea (smelter).....	322	125	(a)
Hungary (estimated).....	200	800	(a)	Turkey (smelter).....	7,208	4,590	2,161
				New Caledonia.....	138	500	(a)
				Total.....	1,220,000	1,110,000	930,000
				World's Total..	1,720,000	1,630,000	1,350,000

(a) Information not available.

(b) Amount estimated as recoverable.

(c) Excluding Virginia, the production of which was in earlier years about 2,000 tons per annum.

(d) Years ended March 31 of the year following that stated.

Table 77.—World Metal Production of Lead, 1929-1931

(Supplied by *Imperial Institute*)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	10,668	10,219	10,554	—con.			
Northern Rhodesia.....	1,635			Portugal.....	93		106
S. W. Africa (d).....	2,758	3,603	2,599	Roumania.....	556	969	1,293
Canada.....	135,915	135,925	124,307	Russia (years ended			
India.....	80,233	79,730	74,785	Sept. 30).....	8,300	10,580	11,000
Australia (f).....	177,509	168,543	150,436	Spain.....	140,498	121,317	107,899
Total.....	409,000	398,000	363,000	Sweden.....	71	7	(a)
FOREIGN COUNTRIES				Tunis.....	19,133	19,100	18,810
Austria.....	6,465	6,825	6,020	Mexico.....	224,473	211,167	204,000
Belgium (b).....	81,541	84,022	(a)	United States.....	638,988	548,537	371,297
Czechoslovakia.....	4,536	4,158	3,601	Argentina.....	7,968	8,863	7,493
France.....	20,036	19,900	19,000	Peru.....	21,072	16,630	3,427
Germany (c).....	122,264	133,620	118,420	French Indo-China.....	17	11	(a)
Greece.....	5,276	7,213	6,601	Brazil (estimated).....	400	(a)	(a)
Hungary.....	107	69	51	Japan.....	3,321	3,524	4,006
Italy.....	22,292	23,956	24,489	Korea.....	322	125	(a)
Jugoslavia.....	10,257	9,889	7,806	Turkey.....	7,208	4,590	1,204
Norway.....	903	787	342	Total.....	1,380,000	1,280,000	1,040,000
Poland.....	35,224	39,573	31,372	World's Total..	1,799,000	1,680,000	1,400,000

(a) Information not available.

(b) Includes base bullion as follows:—1929—22,499 long tons; 1930—22,184 long tons.

(c) Includes some secondary.

(d) Years ending March 31 of the year following that stated.

(e) Including tin.

(f) Includes base bullion as follows:—1929—689 long tons; 1930—252 long tons; 1931—17,130 long tons.

ZINC

Refined zinc is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company, Limited, from ores mined chiefly in British Columbia; in 1930 a new electrolytic zinc refinery was brought into production at Flin Flon, Manitoba, by the Hudson Bay Mining and Smelting Company, Limited; the plants of both of these companies were in continuous operation throughout 1931.

No primary zinc was produced in 1931 in Nova Scotia, Quebec or Ontario. Manitoba's output came entirely from ores treated at the Flin Flon smelter while in British Columbia some of the principal producers of zinc ores in the order of their output were the Sullivan, Silversmith, Wellington, Highland Lass and Planet mines.

Figures for the total Canadian production of zinc are compiled by adding the quantities of refined zinc made at Trail and Flin Flon to the amount of zinc estimated as recoverable from ores and concentrates exported; the value of production is usually calculated at the monthly average price for zinc on the London market for the year, exchange conversion being usually made at par. In 1931, using the par of exchange in London for the first nine months and the average monthly rate of exchange for each of the remaining three months, the average value of zinc for the year in Canadian funds was 2.554 cents per pound.

The total Canadian production of zinc amounting to 237,245,451 pounds in 1931 represents a decrease in quantity of 11.4 per cent from that of the previous year, the valuation of the 1931 output at \$6,059,249 was 37.1 per cent lower than in 1930. Low metal prices combined with a more or less general stagnation in industrial spheres were responsible for the lessened production of base metals in 1931.

Consolidated Smelting and Refining Company reports that production costs in the Trail zinc plant in 1931 were maintained at the 1930 level notwithstanding a ten per cent drop in production; the important feature of the year in this plant was the complete adoption of the Trail concentrate burning process for roasting and improvements in the costs of the zinc oxide leaching plant. The new fuming plant has produced and can continue to produce twenty-three per cent more zinc from the same ore than was formerly possible. This process had added twenty-three per cent to the Sullivan zinc ore reserves. The Hudson Bay Mining and Smelting Company states that their new Flin Flon electrolytic zinc plant operated continuously and efficiently during the year, the average of the electrolytic grade for the year being 99.9865 per cent zinc. This plant treated 63,828 tons of zinc concentrates averaging au. 0.091 ounce, ag. 1.98 ounces, cu. 1.51 per cent, and zn. 40.4 per cent.

The American Bureau of Metal Statistics reports the following as the estimated manufacture of zinc in the United States during 1931, for:—

Galvanizing.....	168,000 short tons
Brass and casting.....	98,000 short tons
Rolled zinc.....	58,300 short tons
Die castings.....	20,000 short tons
Other purposes.....	34,700 short tons
Total.....	379,000 short tons

Table 78.—Production of Zinc from Canadian Ores, by Provinces, 1922-1931

(For years 1898 to 1921 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		Manitoba		British Columbia		Canada	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
1922.....	366,240	24,197	.....	.....	.....	.....	56,290,000	3,217,536	56,290,000	3,217,536
1923.....	2,909,008	184,547	.....	.....	.....	.....	60,050,000	3,967,504	60,416,240	3,991,701
1924.....	9,936,000	757,322	179,545	13,685	.....	.....	96,000,069	6,090,244	98,909,077	6,274,791
1925.....	12,904,176	956,199	.....	.....	.....	.....	99,152,966	7,557,439	109,268,511	8,328,446
1926.....	17,189,046	1,064,690	.....	.....	.....	.....	137,033,929	10,154,214	149,938,105	11,110,413
1927.....	21,057,760	1,156,745	58,724	3,226	.....	.....	148,306,479	9,186,103	165,495,525	10,250,793
1928.....	19,653,440	1,058,731	5,516,806	297,190	.....	.....	163,530,890	8,983,079	184,647,374	10,143,050
1929.....	9,754,160	351,150	3,527,894	127,004	3,882,141	139,757	172,098,841	9,270,857	197,267,087	10,626,778
1930.....	.....	.....	.....	.....	35,173,749	898,338	250,479,310	9,017,255	267,643,505	9,635,166
1931.....	.....	.....	.....	.....	.....	.....	202,071,702	5,160,911	237,245,451	6,059,249

Table 79.—Production of Refined Zinc in Canada, 1922-1931

Year	Short tons	Year	Short tons
1922.....	28,145	1927.....	73,208
1923.....	30,025	1928.....	81,765
1924.....	27,444	1929.....	86,048
1925.....	38,462	1930.....	121,496
1926.....	61,727	1931.....	118,622

NOTE.—For years 1916 to 1921 see previous reports.

Table 80.—Imports into Canada and Exports of Zinc and Brass, 1929-1931

	1929		1930		1931	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS		\$		\$		\$
Zinc and Zinc Products—						
Zinc in blocks, pigs, bars and rods and zinc plates, n.o.p.....	3,212	280	2,588,853	124,128	403,205	12,798
Zinc in sheets and strips and zinc plates for marine boilers.....	10,628,131	787,152	6,024,973	410,467	4,013,796	272,012
Zinc, as spelter.....	2,658,483	165,566	1,860,276	90,270	22,378	1,073
Zinc white (80% Zn.).....	19,052,472	1,248,680	14,575,729	885,580	11,483,357	641,570
Zinc dust.....	483,192	38,891	506,670	37,853	527,641	40,032
Zinc, sulphate and chloride of.....	3,123,840	125,742	2,685,186	96,242	2,242,204	77,278
Zinc, manufactures of.....		167,795		161,583		122,131
Lithopone.....	19,408,436	852,079	16,051,513	722,341	13,862,914	560,037
Total.....		3,356,173		2,528,464		1,726,931
Brass and Brass Products—						
Brass, in blocks, pigs and ingots.....	1,008,500	165,444	1,391,700	183,829	1,037,300	99,879
Brass, scrap.....	4,780,200	617,492	1,808,900	206,535	611,100	47,407
Brass, tubing not polished, bent or otherwise manufactured in lengths not less than 6 feet.....	4,074,669	1,020,931	3,628,084	766,872	3,036,636	509,151
Brass, plain wire, n.o.p.....	471,797	138,000	528,775	127,943	365,363	76,954
Brass, bars, rods, coils, not less than 6 feet in length.....	1,021,700	202,910	729,700	142,531	400,000	57,852
Brass, strips, sheets or plates.....	1,105,300	265,925	1,018,400	205,893	578,200	96,297
Brass, wire cloth, n.o.p.....		63,895		47,027		45,404
Brass, cups for manufacture of shells.....		173,609		119,831		57,135
Brass, caps for electric batteries.....		11,137		7,984		4,973
Brass, hand-pumps.....		31,287		14,627		7,860
Brass, nails, tacks, etc.....		8,645		1,961		1,374
Brass and copper rivets, burrs and washers.....		227,652		73,984		26,288
Brass valves.....		571,551		440,883		286,736
Brass, other manufactures, n.o.p.....		4,004,585		3,095,430		2,219,055
Carburettors of brass.....		43,790		12,536		6,005
Total.....		7,546,853		5,447,866		3,542,370
EXPORTS						
Zinc—In Ore.....	25,738,900	1,415,725	46,964,100	1,014,915		
Ore.....						
Spelter.....	135,085,700	7,031,645	150,964,100	5,146,215	238,018,000	5,554,511
Scrap, dross and ashes.....	7,638,200	262,719	4,808,900	92,651	1,093,100	10,018
Total.....		8,710,059		6,253,781		5,564,529
Brass—						
Old and scrap dross and ashes.....	11,918,500	1,206,510	6,175,900	485,478	3,724,300	185,392
Rods, sheets and tubing.....	66,900	15,910	52,800	13,654	18,200	3,398
Valves.....		282,429		220,253		161,702
Mfrs. of brass, n.o.p.....		892,850		741,352		554,009
Total.....		2,397,699		1,460,737		904,501

Table 81.—Monthly Average Prices of Zinc at Montreal, St. Louis and London, 1929-1931

Month	Montreal ¹ (In cents per pound)			St. Louis ² (In cents per pound)			London ² (In pounds Sterling per long ton)		
	1929	1930	1931	1929	1930	1931	1929	1930	1931
January.....	7-29	5-950	4-360	6-350	5-229	4-035	26-196	19-634	12-747
February.....	7-30	5-825	4-230	6-350	5-180	4-012	26-247	19-209	12-303
March.....	7-37	5-550	4-220	6-463	4-934	4-002	27-050	18-304	12-190
April.....	7-23	5-340	3-960	6-658	4-843	3-717	26-759	17-819	11-353
May.....	7-05	5-070	3-660	6-618	4-641	3-306	26-727	16-639	10-484
June.....	7-00	4-990	3-800	6-686	4-441	3-416	26-216	16-422	11-270
July.....	6-94	4-920	3-978	6-766	4-350	3-893	25-332	16-171	12-280
August.....	6-85	4-880	3-786	6-800	4-360	3-817	24-896	15-953	11-444
September.....	6-74	4-830	3-707	6-799	4-270	3-744	24-208	15-773	11-571
October.....	6-50	4-480	3-750	6-740	4-050	3-377	22-927	14-446	12-733
November.....	6-15	4-600	4-014	6-242	4-266	3-209	20-851	14-706	13-845
December.....	6-00	4-570	4-068	5-666	4-099	3-149	20-103	13-762	14-361
Average.....	6-87	5-084	3-961	6-512	4-556	3-640	24-793	16-570	12-215

¹Supplied by Consolidated Mining and Smelting Co., Montreal, P.Q.²From the *Engineering and Mining Journal*.

Converted at par, the average London quotation in cents per pound in 1929 was 5-387 cents, and in 1930 it was 3-600 cents per pound.

In 1931 using the par of exchange in London for the first 9 months and the average monthly rate of exchange for each of the remaining three months the average value of zinc for the year in Canadian funds was 2-554 cents per pound.

CONSUMPTION OF ZINC IN CANADA, 1930 AND 1931

The apparent consumption of metallic zinc in Canada during 1931 amounted to 33,924,000 pounds as compared with 41,417,000 pounds in 1930. These estimates were based on the following data:—Canadian refinery sales of refined zinc in 1931 totalled 267,503,000 pounds; exports of spelter, 238,018,000 pounds; imports of spelter, 22,000 pounds; imports of blocks, sheets, etc., 4,417,000 pounds. Refinery sales of refined zinc in 1930 amounted to 181,907,000 pounds; exports of spelter totalled 150,964,000 pounds; imports of spelter, 1,860,000 pounds; imports of blocks, sheets, etc., 8,614,000 pounds. Census of Industry surveys conducted by the Bureau during 1930 give the metallic zinc consumption in the major zinc consuming industries as: alloys (white metals) 1,166,000 pounds; iron and steel industry, 25,136,000 pounds; electrical industry, 2,669,000 pounds. In 1931 the zinc consumption for these same industrial groups were recorded as follows: alloys (white metal) 301,282 pounds; iron and steel industry, 19,208,118 pounds; electrical industry, 2,861,197 pounds. The differences between the quantities of zinc as shown under apparent consumption and amounts credited to the individual industries are to be accounted for either by annual (inventory) carry-overs, scrap consumption, or assimilation of metal by consumers not included in the industrial groups under review.

Table 82.—World Metal Production of Zinc, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES— Concluded			
United Kingdom (a).....	58,298	48,598	21,241	Netherlands.....	25,206	22,888	19,018
Northern Rhodesia.....	12,121	17,907	6,927	Norway.....	5,429	34,064	38,849
Canada.....	76,829	108,479	105,913	Poland.....	166,359	171,608	128,691
Australia.....	51,872	54,901	53,832	Russia (years ended Sept. 30).....	4,300	4,577	9,000
Total.....	199,000	230,000	188,000	Spain.....	11,639	10,528	9,935
FOREIGN COUNTRIES				Sweden.....	4,697	4,139	92
Belgium.....	194,774	173,447	136,300	Mexico.....	16,031	18,450	35,056
Czechoslovakia.....	10,506	13,259	7,792	United States (a).....	553,435	444,683	260,711
France.....	85,951	85,500	61,500	French Indo-China.....	3,748	3,795	2,836
Germany (a).....	106,717	99,784	47,853	Japan.....	21,750	24,280	25,006
Italy.....	15,554	18,960	16,646	Total.....	1,240,000	1,140,000	800,000
Jugoslavia.....	6,191	5,418	4,393	World's Total.	1,440,000	1,370,000	990,000

(a) Includes some secondary.

Table 83.—World Production of Zinc Ore (In terms of Metal) 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES— Concluded			
United Kingdom.....	851	647	196	Poland.....	138,000	118,000	62,000
Nigeria.....		12		Russia.....	10,500	17,700	20,000
Northern Rhodesia.....	22,230	19,477	6,927	Spain.....	50,500	48,200	38,000
Canada (shipments).....	138,298	117,726	192,302	Sweden.....	29,456	29,500	28,700
Newfoundland (estimated).....	23,000	23,000	38,000	Algeria.....	13,576	7,836	3,137
India.....	55,400	60,700	45,300	Egypt.....	578	300	
Australia.....	154,562	119,613	74,212	French Morocco.....	1,018	400	(a)
Total.....	394,000	341,000	357,000	Tunis.....	3,691	800	400
FOREIGN COUNTRIES				Mexico.....	171,301	122,124	118,360
Austria.....	3,897	3,501	686	United States.....	646,855	531,647	366,355
Belgium (b).....	5,000	4,000	4,000	Bolivia (exports).....	1,373	5,933	14,438
Czechoslovakia.....	8	632	1,362	Chile.....	38	1	(a)
Finland.....	802	443	(a)	Peru.....	23,312	(a)	(a)
France.....	9,983	8,000	6,000	China.....	8,000	6,000	5,800
Germany.....	140,217	136,462	103,358	French Indo-China.....	18,464	15,600	8,000
Greece.....	5,814	3,637	5,631	Korea (ore).....	5,018	(a)	(a)
Hungary.....	120	480	(a)	Japan (b).....	10,000	10,000	10,000
Italy.....	85,666	78,309	53,833	Turkey (estimated).....	5,700	2,900	1,000
Jugoslavia.....	170			New Caledonia.....	805	1,000	(a)
Norway.....	1,423	7,509	7,310	Total.....	1,390,000	1,180,000	880,000
				World's Total...	1,780,000	1,520,000	1,240,000

(a) Information not available.

(b) Metallgesellschaft estimate.

CHAPTER FOUR

THE NICKEL-COPPER INDUSTRY IN CANADA

Including Commodity Statistics Tables on Nickel, Copper, and Metals of the Platinum Group

1. General Review.
2. Commodity statistics including tables showing production by provinces, imports, exports, prices and world output of nickel, copper and metals of the platinum group.

1. GENERAL REVIEW

(a) **Definition of the Industry.**—The nickel-copper industry in Canada includes the mining, smelting and to a certain extent, the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., and Kristiansand, Norway. In addition to these shipments, a semi-finished material (washed nickel sulphides) of high nickel content, produced at Port Colborne, is exported for refining in Clydach, Wales.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 14 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production and trade statistics on nickel, copper and the metals of the platinum group are given in this chapter.

(b) **Historical.**—Construction of railways in Canada has resulted in the discovery of some valuable mineral deposits. One of these was the finding of the nickel-copper ores of the Sudbury area during the building of the Canadian Pacific Railroad in 1883. The first of these ore bodies was mined for copper in 1886 and it was not until 1887 that the presence of nickel was detected. Almost coincident with these discoveries occurred the introduction of nickel in the manufacture of special steels. This stimulated an almost continuous growth in the industry, a growth which has firmly established Canada as the premier nickel producing nation of the world.

For many years the principal use for nickel was in the manufacture of war material, especially in armour plate; this particular consumption of the metal reached its maximum during the late World War. Following the cessation of hostilities the demand for nickel was greatly reduced and it was largely by intensive research that new uses for the metal were developed and production re-established on a firmer and broader basis. The almost universal industrial expansion of the past decade was largely responsible for the high record production of 110,275,912 pounds of nickel from Canadian mines in 1929. Production of the metal has since declined, sharply reflecting the general and severe economic depression of 1930 and 1931.

(c) **Importance of Nickel, Copper and Platinum Group Metals.**—Canada supplies about 90 per cent of the world's nickel requirements, the remainder being obtained largely from New Caledonia. A small amount of nickel is recovered from the silver-cobalt ores of the Cobalt district, most of the Canadian nickel output is, however, produced from the ores of the Sudbury area.

Copper produced from the nickel-copper ores in Ontario constitutes about 38 per cent of the total copper obtained from all Canadian ores. British Columbia, mining and smelting copper and copper-gold ores, produces approximately 22 per cent of Canada's copper output. Quebec supplies 23 per cent and the Manitoba production accounts for the balance.

As a world producer of copper, Canada ranks third; United States is the leading copper producing country followed, according to importance, by Chile, Canada, Belgian Congo, and Japan. Until within the last two years the amount of refined copper produced in Canada has been relatively small; previously it was found more profitable to ship blister copper

or copper in matte or in concentrates to foreign metallurgical plants for conversion to refined metal. An increase in the Canadian demand for electrolytic copper may be expected as a phase of future industrial expansion and the output of refined copper from the two new Canadian refineries should increase proportionately with the return of normal business conditions.

Some gold and silver, together with metals of the platinum group, including, in addition to platinum, the associated metals, palladium, rhodium, osmium and iridium, are present in varying amounts in the ores of the Sudbury district. The amounts of these metals in the different Sudbury nickel deposits vary considerably and their recovery has been a factor of growing importance in the metallurgical treatment of the nickel ores.

At the present time Canada produces a very considerable proportion of the world's supply of platinum; recovery of most of this metal is carried out in refineries operating outside the confines of the Dominion.

Sales of nickel from the Port Colborne (Canada) and Clydach (Wales) refineries of the International Nickel Company amounted to 42,096,126 pounds in 1931 as compared with 56,934,612 pounds in 1930 and 95,394,808 pounds in 1929. These reduced outputs represent annual decreases of 40 per cent in 1930 and 26 per cent for 1931. Nickel in products of the rolling mills at Birmingham (England) and Huntington (West Virginia) and of the foundry at Bayonne (New Jersey) totalled 13,642,921 pounds as compared with 18,349,740 pounds in 1930, a decrease of 26 per cent. Sales of "monel metal" a product made direct from Creighton mine ore totalled 13,158,745 pounds compared with 18,961,706 pounds in 1930, a decrease of 31 per cent; sales of rolled nickel at 4,084,084 pounds were ten per cent less than the previous year. Copper sales, inclusive of copper in sulphate produced in Wales, decreased from 109,743,747 pounds to 96,919,677 pounds or 12 per cent. Gold sales were 23,384 ounces, silver sales 822,983 ounces, and sales of platinum metals 51,585 ounces. The markets for copper, the platinum metals and silver, important products of the company, have been badly disrupted since 1929; the results are that prices have been abnormally low and that the company's earnings have been greatly reduced. The year 1931 witnessed a continuation of the declining metal prices and consumption as were prevalent during the preceding year.

(d) **Mining, Smelting and Refining.**—Development at the Froid mine of the International Nickel Company Limited was reduced to a minimum in keeping with general curtailment, the total workings in the mine now extend 24 miles and sixty-one stopes are each prepared to yield an estimated production of 150 tons of ore per day. The Copper Cliff smelter (Ontario) treated 1,347,722 tons of ore and produced 72,747 tons of bessemer matte and 22,013 tons of blister copper, the new Orford process plant located in the same place was completed and made ready for operation. At the Coniston plant (Ontario) operations were greatly curtailed, only two of its four blast furnaces running from January to September and one blast furnace and the sintering plant for the balance of the year; this plant smelted 427,717 tons of ore and produced 23,163 tons of bessemer matte; at the Port Colborne refinery of the same company there were produced in 1931—31,877,840 pounds of nickel excluding sulphide for the Clydach refinery as compared with 61,704,271 pounds in 1930. There were also produced 28,688 tons of blister copper compared with 59,503 tons in 1930. The Ontario Refining Company Limited operated their Copper Cliff plant at only fifty per cent capacity during the year.

Falconbridge Nickel Mines Limited report an ore production (hoisted) of 133,721 tons in 1931. The smelter of the company was in operation a total of 336 days or 91.34 per cent of the total possible operating time, 109,520 tons of ore were smelted and 4,363 tons of matte produced of which 4,277 tons were shipped to the company's refinery at Kirstiansand, Norway; 2,569 tons of nickel and 1,033 tons of copper were recovered. Falconbridge ore reserves as of December 31, 1931, are reported at 2,725,382 tons averaging 2.31 per cent nickel, and 0.94 per cent copper.

In spite of the world wide industrial depression nickel products have more than retained their relative industrial position as judged by certain comparable industrial indices. Thus the 1931 consumption of nickel in its largest market, the United States, amounted to 160 per cent of the average for the years 1920, 1921 and 1922 and to 85 per cent of the average for the years 1926 and 1927.

One of the most interesting new nickel products introduced during the past year was nickel-clad steel plate. This has been introduced into several fields such as for the manufacture of storage tanks and tank cars, evaporator bodies, chemical autoclaves, kettles, etc.

Table 84.—Capital Employed in the Nickel-Copper Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
Capital employed as represented by:—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment—		
Mines.....	22,793,333	20,834,771
Smelters and Refinery.....	42,090,959	43,417,737
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	11,537,402	10,961,881
(c) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	6,014,901	1,488,559
Total.....	82,436,595	76,702,948

Table 85.—Output from Nickel-Copper Mines and Smelters in Canada, 1930 and 1931

	1930	1931
Ore mined..... tons	2,127,043	1,714,075
Ore shipped..... tons	2,115,139	1,689,874
Content of ores, etc., shipped:—		
Copper..... lb.	142,948,534	123,641,190
Nickel..... lb.	122,195,531	89,424,886
Ores and concentrates treated at smelters..... tons	2,357,154	1,884,959
Matte produced..... tons	166,703	100,273
Content of matte:—		
Copper..... lb.	141,600,753	77,621,143
Nickel..... lb.	122,224,692	81,285,931
Matte shipped to Canadian refineries..... tons	137,364	63,076
Matte exported to Foreign smelters..... tons	34,550	30,294

Table 86.—Proportion of Nickel and Copper in Sudbury Matte, 1922-1931

Year	Percentage			Year	Percentage		
	Nickel	Copper	Total		Nickel	Copper	Total
1922.....	50.1	31.3	81.4	1927.....	48.4	31.7	80.1
1923.....	53.4	27.2	80.6	1928.....	47.6	32.6	80.2
1924.....	52.6	27.9	80.5	1929.....	44.0	35.1	79.1
1925.....	52.1	27.9	80.0	1930.....	36.6	42.5	79.1
1926.....	49.6	30.6	80.2	1931.....	40.5	38.7	79.2

NOTE.—For years 1912 to 1921 see previous reports.

Table 87.—Employees, Salaries and Wages, in the Nickel-Copper Industry in Canada, 1930 and 1931

	1930				1931			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees—								
Mine and mill.....	42	1	43	178,211	41		41	170,155
Smelters and refinery.....	145	16	161	560,525	139	14	153	546,069
Total.....	187	17	204	738,736	180	14	194	716,224
Wage-earners—								
Mine and mill.....	3,440		3,440	5,210,572	2,092		2,092	2,980,085
Smelters and refinery.....	3,077		3,077	4,776,585	2,014		2,014	3,308,094
Total.....	6,517		6,517	9,987,157	4,106		4,106	6,288,179
Grand total.....	6,704	17	6,721	10,725,893	4,286	14	4,300	7,004,403

NICKEL

Production figures include nickel in matte or speiss exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides or salts sold, valued in the aggregate at the sum obtained from the sales of oxides or salts.

Table 88.—Production of Nickel from Canadian Ores, 1922-1931

(For years 1889 to 1921 see 1928 report on the Mineral Production of Canada)

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
		\$			\$
1922.....	17,597,123	6,158,993	1927.....	66,798,717	15,262,171
1923.....	62,453,843	18,332,077	1928.....	96,755,578	22,318,907
1924.....	69,536,350	19,470,178	1929.....	110,275,912	27,115,461
1925.....	73,857,114	15,946,672	1930.....	103,768,957	24,455,133
1926.....	65,714,294	14,374,163	1931.....	65,666,320	15,267,453

Table 89.—Production of Canada, Imports and Exports of Nickel, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
PRODUCTION—						
Nickel in matte and speiss exported*.....	28,172,633	5,071,074	41,959,927	7,552,574	33,693,483	6,064,827
Refined and electrolytic nickel produced.....	70,704,762	18,639,814	57,478,651	15,485,381	28,972,201	8,087,271
Nickel in oxides and salts sold.....	11,398,517	3,404,573	4,330,279	1,417,178	3,000,636	1,115,355
Total.....	110,275,912	27,115,461	103,768,857	24,455,133	65,666,320	15,267,453
IMPORTS—						
Nickel, nickel silver and German silver, in ingots or blocks, n.o.p.....	31,006	8,492	37,462	9,250	36,001	5,318
Nickel in bars and rods, strips, sheets and plates.....	1,243,865	388,296	1,120,122	347,461	616,027	228,435
Nickel silver and German silver, in bars, rods, strips, sheets, plates or anodes.....	258,445	94,827	180,122	69,664	85,708	26,558
Nickel chromium, in bars and rods.....	71,938	72,790	44,344	44,434	44,111	45,033
German, Nevada and nickel silver, manufactures of, not plated.....		606,236		471,036		229,412
Nickel-plated household hollow-ware.....		94,796		18,401		13,213
†Nickel kitchenware.....				2,261		2,597
Nickel-plated ware, n.o.p.....		3,224,828		2,004,398		1,185,115
Total nickel and its products.....		4,490,263		2,966,905		1,735,681
EXPORTS—						
Nickel, fine.....	68,408,200	17,544,513	43,122,500	11,262,512	27,132,700	7,140,420
Nickel contained in matte.....	29,630,700	4,501,389	44,890,400	8,142,794	33,287,600	6,048,508
Nickel in oxide.....	11,600,900	3,489,782	3,733,000	1,100,018	3,108,300	992,637
Total.....	109,639,800	25,535,684	91,745,900	20,505,324	63,528,600	14,181,565

*Nickel in matte and speiss exported valued at 18 cents per pound.

†April 1 to December 31, 1930.

Table 90.—World Production of Nickel Ore, 1929-1931

(In terms of metal)

(Supplied by the Imperial Institute)

(Long tons)

Country	1929	1930	1931
British Empire—			
Canada.....	49,230	46,325	29,315
India (a).....	830	951	879
Australia.....	85	118	(1 cwt.)
Foreign countries—			
Greece.....	254		638
Norway.....	431	862	523
United States (b).....	306	275	333
New Caledonia (c).....	4,300	4,800	3,800
World's Total.....	55,400	53,300	35,500

(a) Nickel metal in speiss obtained as a by-product in smelting operations.

(b) Nickel content of salts and nickel produced as a by-product in the electrolytic refining of copper.

(c) Estimated content of matte and ferro-nickel obtained at smelters.

COPPER

CANADA

Copper production includes copper contained in ores and concentrates exported, copper in blister copper made, in matte exported and in any primary copper sulphate made during the year.

Refined copper was produced commercially in quantity for the first time in Canada in 1916 at the Trail refinery of the Consolidated Mining and Smelting Company. The British America Nickel Corporation which produced refined copper at the Deschenes refinery for the first time in 1920, went into liquidation during July, 1924.

The production of primary copper in Canada, in 1931 was 292,304,390 pounds valued at \$24,114,065 as compared with 303,478,356 pounds worth \$37,948,359 in 1930. This represents decreases of 11,173,966 pounds in volume and \$13,834,294 in value. The 1931 output was, however, greater than that in 1929. Unfortunately, the abnormally low prices for copper existing throughout the year under review resulted in a considerable reduction in valuation as contrasted with 1929. Manitoba was the only province to record an increased copper output in 1931. This especially reflects the first full year's operation of the new Flin Flon smelter of the Hudson Bay Mining and Smelting Company; operating efficiency at the property was greatly improved and costs lowered, the company reports that the 1931 metal production was entirely sold. The copper output of the province was also considerably increased when the first unit of the Sherritt Gordon mill started on March 10th, 1931; by the middle of May the rated capacity of the unit, 600 tons in 24 hours, was reached. During the operating period of nine months the mine produced 14,718,387 pounds of copper and \$134,305 of gold and silver from 214,081 tons of ore. Sherritt Gordon concentrates are treated at the Flin Flon smelter. Lower copper outputs for Ontario and Quebec were due largely to reductions in the production of this metal by the International Nickel Company of Canada, Limited, and Noranda Mines Limited. In British Columbia the closing of the Copper Mountain mine by the Granby Consolidated Mining and Smelting Company, Limited was the greatest contributing cause of the lessened production of copper in that province. Both the Britannia mine on Howe Sound, B.C., and the Eustis mine in Quebec were steady producers and shippers of copper concentrates throughout 1931. The products from these properties were exported for smelting in United States plants.

Electrolytically refined copper was produced in 1931 by the Ontario Refining Company Limited at Copper Cliff, Ontario, and by the Canadian Copper Refiners Limited at Montreal East, P.Q. The former company produces wire bars, ingot bars, V.C. cakes, cathodes, slabs and billets; Canadian Copper Refiners supply ingots to Canada Wire and Cable Co. Limited, an allied company. These are used in the production of round rods, drawn copper for shaped or round trolley wire, large and small drawn copper wire either plain or tinned, medium or soft, stranded wires and cables and all ranges of weatherproof wires and cables. The copper refinery of the Consolidated Mining and Smelting Co. Limited, located at Trail, B.C., was inactive throughout 1931. Operating copper refineries in Canada possess a capacity of 195,000 tons of refined copper a year.

The average New York price for electrolytic copper during 1931 was 8.116 cents per pound as compared with 12.982 cents in 1930; using the par of exchange in New York for the first nine months of 1931 and the average monthly rate of exchange for each of the last three months, the average value of copper in Canadian funds for the year was 8.370 cents per pound.

Table 91.—Production of Copper from Canadian Ores, 1922-1931

Year	Pounds	Value	Cents per pound	Year	Pounds	Value	Cents per pound
		\$				\$	
1922.....	42,879,818	5,738,177	13.382	1927.....	140,147,440	17,195,487	*
1923.....	86,881,537	12,529,186	14.421	1928.....	202,696,046	28,598,249	*
1924.....	104,457,447	13,604,538	13.024	1929.....	248,120,760	43,415,251	*
1925.....	111,450,518	15,649,882	14.042	1930.....	303,478,356	37,948,359	*
1926.....	133,094,942	17,490,300	*	1931.....	292,304,390	24,114,065	*

*Since 1926 the value of Canada's copper production was computed according to the note on page 210.
NOTE.—For years 1886 to 1921 see previous reports.

Table 92.—Production of Copper in Canada, by Provinces and by Sources, 1930 and 1931

Production	1930		1931	
	Pounds	Value	Pounds	Value
		\$		\$
BY PROVINCES—				
Quebec.....	80,310,363	10,425,891	68,376,985	5,723,154
Ontario.....	127,718,871	15,187,259	112,882,625	9,096,463
Manitoba.....	2,087,609	215,018	45,821,432	3,835,254
British Columbia.....	93,318,885	12,114,657	65,223,348	5,459,194
Yukon.....	42,628	5,534		
Total.....	303,478,356	37,948,359	292,304,390	24,114,065
BY SOURCES—				
In blister copper produced.....	223,890,467	27,965,905	243,805,331	20,434,685
In copper sulphate produced.....	183,575	23,831		
In ores and copper matte exported.....	67,694,448	8,787,636	35,258,939	2,951,174
In nickel-copper matte exported.....	11,709,866	1,170,987	13,240,120	728,206
Total.....	303,478,356	37,948,359	292,304,390	24,114,065

Table 93.—Production of Refined Copper in Canada, 1922-1931

Year	Tons	Year	Tons
1922.....	365	1927.....	9,191
1923.....	824	1928.....	8,806
1924.....	1,768	1929.....	3,518
1925.....	170	1930.....	31,377
1926.....	10,581	1931.....	92,183

NOTE.—For years 1916 to 1921 see previous reports.

Table 94.—Production of Copper Sulphate in Canada, 1922-1931

Year	Pounds	Year	Pounds
1922.....	230,835	1927.....	566,825
1923.....	307,135	1928.....	771,400
1924.....	127,301	1929.....	617,430
1925.....	121,746	1930.....	734,300
1926.....	404,862	1931.....	62,140

The Consolidated Mining and Smelting Company Limited of Trail, B.C., is the only company producing copper sulphate in Canada, the output being used by them in their own plant.

QUEBEC

Copper production from the province of Quebec in 1931 included the estimated recovery of copper contained in concentrates shipped by the Consolidated Copper and Sulphur Company, Limited, and the copper in blister made at the Noranda smelter from Quebec ores.

ONTARIO

Statistics of copper production in Ontario for 1931 included the copper contained in converter copper made by the International Nickel Company, Limited, at the Port Colborne, refinery and Copper Cliff Smelter; the copper in nickel-copper matte exported by this company and the Falconbridge Nickel Mines, Limited; the recoverable copper in concentrates exported by silver-cobalt mines and the copper in ores shipped to the Noranda smelter.

MANITOBA

Copper production in Manitoba during 1931 consisted of the metal contained in blister copper made by the Hudson Bay Mining and Smelting Company Limited, from ores mined at the Flin Flon and Sherritt Gordon Mines; blister made in Manitoba was refined at copper refineries situated at Copper Cliff, Ontario, Montreal East, Quebec, and in the United States.

BRITISH COLUMBIA

A production of 65,223,348 pounds of copper in British Columbia was considerably less than that of the previous year; the greater part of the year's output consisted of the metal contained in blister copper made at the Anyox smelter of the Granby Consolidated Mining, Smelting and Power Company, and in copper concentrates shipped to United States smelters from the Britannia mine. Considerable copper is contained in a matte produced from lead ores treated at the Trail smelter; this is exported to the United States for refining. A comparatively small amount of copper was also contained in exports of ore from one of the smaller mines.

Table 95.—Quantity and Value of Copper Produced in Canada, by Provinces, 1922-1931

(For production in previous years see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Manitoba		British Columbia		Yukon	
	lb.	\$	lb.	\$	lb.	\$	lb.	\$	lb.	\$
1922			10,943,636	1,464,477			31,936,182	4,273,700		
1923			31,656,800	4,565,227			55,224,737	7,963,959		
1924	1,893,008	246,546	37,113,193	4,833,622			65,451,246	8,524,370		
1925	2,510,141	352,474	39,718,777	5,577,311			69,221,600	9,720,097		
1926	2,674,058	368,886	41,312,867	4,828,964			89,108,017	12,292,450		
1927	3,119,848	409,084	45,341,295	4,946,533			91,686,297	11,845,870		
1928	33,697,949	4,909,791	66,607,510	8,770,149			102,283,210	14,902,664	*107,377	15,645
1929	55,337,169	10,019,901	88,879,853	14,622,572			103,903,738	18,772,778		
1930	80,310,363	10,425,891	127,718,871	15,187,259	2,087,609	215,018	93,318,885	12,114,657	42,628	5,534
1931	68,376,985	5,723,154	112,882,625	9,096,463	45,821,432	3,835,254	65,223,348	5,459,194		

*Includes small quantities produced in 1925, 1926 and 1927 but not reported until 1928.

Table 96.—Imports into Canada and Exports of Copper, 1929-1931

	1929		1930		1931	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS—		\$		\$		\$
Copper in bars or rods, when imported by manufacturers or trolley, telegraph and telephone wires, electric wires and electric cables for use only in the manufacture of such articles in their own factories also copper bars for use only in the manufacture of rods to be used exclusively in the manufacture of electrical conductors and copper rods for such manufacture, the individual units of such electrical conductors not exceeding the area of No. 7-0 gauge conductor	54,824,600	9,922,096	30,906,700	4,368,678	9,339,200	960,190
Copper in bars or rods, in lengths of not less than 6 feet, unmanufactured	719,200	164,642	1,595,900	305,381	348,200	52,552
Copper in blocks, pigs or ingots	12,084,000	2,246,600	7,867,200	1,022,936	965,500	97,526
Copper, scrap; cathode plates for melting	4,958,300	827,832	1,443,700	173,114	753,400	73,289
Copper, ore and concentrates						
Copper, in strips, sheets or plates not polished or coated	2,806,300	698,974	1,844,700	410,565	1,074,600	181,782
Copper tubing in lengths of not less than 6 feet, and not polished, bent or otherwise manufactured	2,662,706	721,369	1,895,872	442,842	1,874,087	353,685
Copper wire, n.o.p.	937,858	267,464	722,729	178,299	144,125	30,961
Copper wire cloth, or woven wire of copper		9,613		9,509		7,947
*Copper wire, single or several, covered with cotton, linen, silk, rubber or other material, including cable so covered		809,729		557,027		85,094
Copper, all other, manufactures of, n.o.p.		1,313,811		767,960		483,203
Copper, precipitate of, crude					9,237	1,239
Anodes of nickel, zinc, copper, silver or gold		16,127		9,745		4,377
Copper, sub-acetate of, or verdigris, dry		681		7,528		586
Copper, sulphate of (blue vitriol)	3,054,964	162,491	5,085,027	224,067	4,842,583	192,283
Copper, sulphate of, dehydrated, for agricultural or spraying purposes	1,315,462	74,202	931,552	49,775	389,140	18,045
Copper rollers adapted for use in calico printing		37,664		81,406		87,965
Total		17,272,791		8,602,627		2,630,724

*January 1 to March 31, 1931.

Table 96.—Imports into Canada and Exports of Copper, 1929-1931—Concluded

	1929		1930		1931	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
EXPORTS—						
Copper, fine, contained in ore, matte regulus, etc.	86,999,100	8,944,965	74,804,600	7,236,456	48,761,200	3,891,045
Copper, blister	148,278,500	26,711,867	147,521,400	22,428,176	37,697,700	3,597,146
Copper, old and scrap	11,559,600	1,574,712	6,765,600	740,099	5,127,000	298,228
Copper in bars, rods, strips, sheets, plates and tubing	132,100	35,900	6,959,200	827,944	105,203,200	9,278,441
Copper wire and cable insulated		119,030		111,678		52,463
Copper mfrs., n.o.p.		13,522		10,191		38,390
Total		37,399,996		31,354,544		17,155,713

Table 97.—Monthly Average Prices of Copper (Electrolytic), New York and London, 1929-1931

(From the Engineering and Mining Journal)

	New York (In cents per pound)			London (£ Sterling per long ton)		
	1929	1930	1931	1929	1930	1931
January	16-603	17-775	9-838	78-602	83-250	47-524
February	17-727	17-775	9-724	83-538	83-500	47-950
March	21-257	17-775	9-854	98-356	83-405	47-699
April	19-500	15-621	9-392	89-405	74-338	45-375
May	17-775	12-756	8-665	83-727	59-545	42-175
June	17-775	12-049	8-025	84-013	56-750	38-966
July	17-775	11-023	7-698	84-043	52-522	37-293
August	17-775	10-693	7-292	84-250	50-725	35-388
September	17-775	10-310	6-988	84-363	49-500	36-148
October	17-775	9-597	6-775	83-978	45-772	41-000
November	17-775	10-113	6-558	82-202	48-963	41-190
December	17-775	10-300	6-580	82-569	50-065	44-409
Average	18-107	12-982	8-116	84-921	61-528	42-093

Using the par of exchange in New York for the first 9 months of 1931 and the average monthly rate of exchange for each of the last three months the average value of copper in Canadian funds for the year was 8-370 cents per pound.

Table 98.—World Production of Copper Ore, 1929-1931

(In terms of metal)
(Supplied by Imperial Institute)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES —concluded			
United Kingdom	68	48	66	Russia (estimated)	26,000	33,600	30,600
N. Rhodesia (smelter) (c)	5,466	6,269	22,800	Spain	63,000	62,000	53,000
S. Rhodesia (smelter)	312	1,313	530	Sweden	1,110	794	8,407
South West Africa (b)	12,400	14,900	8,300	Algeria	25	1	
Union of South Africa	8,872	8,491	10,045	Belgian Congo			
Canada	110,768	135,481	130,493	(smelter)	134,828	136,754	118,000
Cyprus	5,800	5,100	3,800	French Equatorial			
India (estimated)	7,500	11,600	11,400	Africa	182	300	150
Australia	12,812	12,984	13,532	Morocco (French)	74		(a)
Total	164,000	196,000	201,000	Cuba	14,720	13,790	11,680
FOREIGN COUNTRIES				Mexico (c)	85,187	72,252	53,355
Austria	2,048	2,181	1,292	United States	890,674	629,530	472,210
Bulgaria (ore)	30,875	27,015	900	Bolivia (exports)	7,074	3,924	2,016
Czechoslovakia	1,338	2,302	1,661	Chile	315,566	216,844	221,000
Finland	4,635	5,051	6,141	Peru	55,228	46,800	43,600
France	587	410	200	Formosa (ore)	97,733	(a)	(a)
Germany	28,525	26,546	29,356	China (estimated)	10	10	12
Hungary	20	30	30	Japan (smelter)	74,277	77,785	74,650
Italy	869	492	368	Korea (smelter)	530	571	(a)
Jugoslavia (estimated)	20,000	23,000	22,000	Turkey	64		61
Norway	18,738	18,004	8,565	New Caledonia		50	(a)
Portugal (estimated)	4,000	4,000	3,000	Total	1,750,000	1,380,000	1,160,000
Roumania	264	137	21	World's Total	1,920,000	1,580,000	1,360,000

(a) Information not available.

(b) Years ended March 31 of the year following that stated.

(c) Amount estimated as recoverable.

Table 99.—World Metal Production of Copper, 1929-1931

(Supplied by *Imperial Institute*)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom				—concluded			
(estimated).....	22,000	18,000	16,000	Jugoslavia.....	20,348	24,077	23,917
Northern Rhodesia..	5,466	6,269	8,927	Norway.....	2,400	5,068	4,283
Southern Rhodesia..	312	1,313	530	Roumania.....	141	167	.....
Union of South Africa	9,162	7,370	10,063	Russia (years ended			
Canada (d).....	71,514	99,951	108,842	30th Sept.).....	30,000	46,700	48,000
India.....	1,635	2,974	4,069	Spain.....	28,100	22,632	25,327
Australia.....	10,874	14,900	12,936	Sweden.....	4,847	5,697	2,958
Total.....	121,000	151,000	161,000	Belgian Congo (f)...	134,828	136,754	118,000
FOREIGN COUNTRIES				Mexico.....	64,094	55,508	43,047
Austria.....	3,834	4,012	3,184	United States.....	983,015	718,088	521,000
Belgium.....	8,799	14,409	(a)	Chile.....	297,732	204,281	211,849
Czechoslovakia.....	1,667	1,497	1,196	Peru.....	53,109	44,943	43,623
Finland.....	231	.....	.....	China (exports).....	3,415	1,184	155
France (b).....	1,370	2,500	(a)	Formosa.....	256	711	(a)
Germany (c).....	52,700	58,300	54,600	Japan.....	74,277	77,785	74,650
Italy.....	530	258	710	Korea.....	530	571	(a)
				Total.....	1,770,000	1,430,000	1,190,000
				World's Total..	1,890,000	1,580,000	1,350,000

(a) Information not available.

(b) Includes some matte.

(c) Includes some secondary.

(d) Copper content of blister copper.

(e) Metallgesellschaft figures.

(f) The 1931 figures are in terms of fine copper; those for previous years refer to blister copper.

CONSUMPTION OF REFINED COPPER IN CANADA, 1930 AND 1931

The apparent Canadian consumption of copper as contained in domestic copper refinery products and in imports not further processed than strips, sheets, tubing and plain wire, totalled 72,793,000 pounds in 1931 as compared with 67,736,000 pounds during 1930. These estimates were based on the following data:—

IMPORTS OF COPPER INTO CANADA, 1930 AND 1931

	1930	1931
	lb.	lb.
Copper in bars and rods.....	32,503,000	9,687,000
Copper in strips, sheets, plates, etc.....	1,845,000	1,075,000
Copper in pig and block.....	7,867,000	965,000
Copper tubing.....	1,896,000	1,874,000
Copper wire, n.o.p.....	723,000	144,000
Total.....	44,834,000	13,745,000

EXPORTS

Copper in bars, rods, strips, sheets, plates and tubing.....	6,959,200	105,203,000
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CANADIAN REFINERY SALES

	lb.
1930.....	29,861,000
1931.....	164,251,000

Copper manufactures (other than those listed above), bronze, brass, and scrap, have not been considered in the compilation of the above figures.

Consumption of copper, chiefly in the form of rods, by the Canadian electrical industry, in 1931 amounted to 40,500,000 pounds as compared with 63,000,000 pounds in 1930. The iron and steel industry in Canada during 1931 absorbed approximately 3,524,000 pounds of copper in all forms as against 7,000,000 pounds in 1930. Some 3,500,000 pounds of copper scrap were utilized during 1931 in the manufacture of brass, bronze, etc. The considerable difference in 1931 between the figure for apparent consumption and those shown for consumption by industries is largely the result of a lag between reported copper sales and recorded exports.

METALS OF THE PLATINUM GROUP

Metals of the platinum group produced from Canadian sources include platinum, palladium, rhodium, iridium, etc., these are recovered in the refining of nickel-copper matte from the Sudbury district; a minor amount of stream platinum is yielded by British Columbia placers and platinum and palladium are sometimes obtained in small quantities from the ores treated in the metallurgical plants of the Consolidated Mining and Smelting Company at Trail, British Columbia.

Production of the platinum group metals in Canada comes almost entirely from the copper-nickel sulphide ores of the Sudbury area. The International Nickel Company Limited is now operating a very complete and modern precious metal refinery at Acton, England; in this plant concentrates containing metals of the platinum group, produced at Port Colborne, Ontario, and Clydach, Wales, from ores of the Frood and Garson mines, are treated. This plant is equipped to refine, at low cost, approximately 300,000 ounces of high purity platinum metals per annum. In British Columbia platinum occurs erratically in the placer deposits of the Tulameen, Quesnel and Findlay rivers.

The world's production of the platinoids is rather difficult to compile owing to the dearth of reliable information regarding the Russian output. It is stated by the Soviet Union in 1930 that the annual production during the last ten pre-war years was about 11,500 pounds.

Colombia, one of the larger producers of these metals, showed a production of 35,793 ounces in 1931. The platinum metals occur in this country in alluvial sands and are recovered largely by dredging. In 1928 South Africa became the world's third greatest producer of platinum. The metal is found, in this field, in the almost vertical dunite pipes of the Lydenburg district; in the large irregular lenses of the Potgietersrust area; and in relatively narrow and very extensive tabular ore bodies of the Rustenberg and Lydenburg districts. Other producing countries include Australia, Tasmania, United States and Abyssinia.

Electrolytic and sponge platinum metals are utilized in the manufacture of iridium-platinum-palladium jewellery alloys, electrical instruments and machinery, high temperature thermocouples, vacuum tube amplifiers, heating elements, electro-plated table ware, catalysts, chemical ware, dental supplies and many other products.

The 1931 production of 44,775 ounces of platinum and 46,918 ounces of palladium, rhodium, iridium, etc., in Canada constitutes the highest Canadian production on record and is the direct result of the increased output of mineral products from the mines and metallurgical plants of the International Nickel Company.

Prices for platinum have fluctuated greatly. In 1883 it was quoted as low as \$5.49 per troy ounce; during 1923 it reached \$125 later receding to \$72 in 1927, while in 1931, it sold at an average New York price of \$35.66 per ounce.

Table 100.—Production of the Platinum Group Metals in Canada, 1930 and 1931

	Platinum		Palladium, Rhodium Iridium, etc.	
	Ounces	Value	Ounces	Value
1930		\$		\$
Ontario.....	34,000	1,542,172	34,040	894,511
British Columbia.....	24	1,089	52	1,356
Total.....	34,024	1,543,261	34,092	895,867
1931				
Ontario.....	44,725	1,595,117	46,918	1,217,717
British Columbia.....	50	1,783		
Total.....	44,775	1,596,900	46,918	1,217,717

Table 101.—Production of Platinum in Canada from Alluvial Sands, 1922-1931

(For years 1887 to 1921 see 1928 Mineral Production of Canada)

Year	Fine ounces	Value	Year	Fine ounces	Value
		\$			\$
1922.....	12	1,154	1927.....	11	960
1923.....	7	816	1928.....	49	2,819
1924.....	5	569	1929.....	28	1,699
1925.....	6	715	1930.....	17	771
1926.....	50	4,258	1931.....	50	1,783

Table 102.—Production of Metals of the Platinum Group, 1922-1931

(From 1887 to 1921 see Mineral Production of Canada, 1928)

Year	Platinum				Palladium	
	Lode		Placer			
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1922.....	4,802	468,762	12	1,154	6,862	446,030
1923.....	6,810	793,617	7	816	8,511	584,280
1924.....	9,181	1,090,858	5	569	8,923	811,993
1925.....	8,692	1,027,477	6	715	7,856	608,727
1926.....	9,471	919,349	50	4,258	9,790	626,166
1927.....	11,217	716,653	11	960	11,247	541,319
1928.....	10,483	706,090	49	2,819	11,909	511,998
1929.....	12,491	845,057	28	1,699	12,408	471,614
1930.....	34,007	1,542,490	17	771	29,959	689,217
1931.....	44,725	1,595,117	50	1,783	39,313	786,260

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1922.....	104				391	31,280		
1923.....	206	18,540					98	26,460
1924.....	367	27,500	78	2,106	69	4,924	79	16,590
1925.....					432	40,242		
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			242	78,553
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						
1931.....	(a) 7,605	431,457						

(a) Includes rhodium, iridium and ruthenium as other platinum metals.

Table 103.—Imports into Canada and Exports of Platinum, 1929-1931

	1929		1930		1931	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
IMPORTS—		\$		\$		\$
Crucibles.....		13,019		12,249		7,106
Wire and bars, strips, sheets or plates, platinum, palladium, iridium, osmium, ruthenium and rhodium in lumps, ingots, powder, sponge or scrap.....		157,774		87,467		45,802
Retorts, pans, condensers, tubing and pipe when imported by manufacturers of sulphuric acid for use exclusively in the manufacture or concentration of sulphuric acid in their own factories.....		41,113		23,135		1,520
Total.....		211,906		122,851		54,428
EXPORTS—						
Platinum contained in ores and concentrates.....	2,798	220,200	19,835	1,610,945	14,202	1,135,388
Old and scrap.....	112	5,319	285	15,653	81	2,070
Total.....	2,910	225,519	20,120	1,626,598	14,283	1,137,458

Table 104.—Platinum Metals Consumed in the United States as Reported by Refiners and by Industries, 1930 and 1931(From *Mineral Industry, 1931*)

(In Troy ounces)

Industry	Platinum	Palladium	Iridium	Others	Total	Percentage of total
1930						
Chemical.....	15,022	854	34	49	15,959	13.00
Electrical.....	8,529	9,569	864	70	19,032	16.00
Dental.....	11,810	15,436	111	6	27,363	23.00
Jewellery.....	44,801	2,807	2,407	526	50,541	43.00
Miscellaneous.....	3,324	1,621	208	876	6,029	5.00
Total.....	83,846	30,287	3,624	1,527	118,924	100.00
1931						
Chemical.....	11,483	979	18	64	12,544	11
Electrical.....	8,215	22,628	609	17	31,469	26
Dental.....	10,135	9,394	74	13	19,616	17
Jewellery.....	41,261	2,988	2,185	264	46,698	39
Miscellaneous.....	5,896	1,934	373	667	8,870	7
Total.....	76,990	37,923	3,259	1,025	119,197	100

Table 105.—World Production of Platinum Metals, 1929-1931(Supplied by *Imperial Institute*)

(Fine ounces)

Country and Product	1929	1930	1931	Country and Product	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES			
<i>Sierra Leone</i> —				<i>Russia</i> —			
Crude.....	26	542	594	Crude platinum.....	100,000	(a)	(a)
<i>Union of South Africa</i> —				<i>Abyssinia</i> —			
Crude (content).....	24,084	49,375	41,220	Platinum.....	3,842	3,805	(a)
Concentrates (content)..	5,730	5,967	5,943	<i>United States</i> —			
Osmiridium.....	5,810	5,732	6,306	Platinum from placers...	797	527	885
<i>Canada</i> —				Domestic crude platinum			
Platinum from placers..	28	17	20	purchased by refiners..	516	797	446
Recovered from Ontario				New platinum metals re-			
nickel-copper matte—				covered by refineries			
Platinum.....	12,491	34,007	44,775	(b).....	47,977	43,502	36,205
Palladium.....	12,408	29,959	46,918	<i>Colombia</i> —			
Other metals.....	4,910	4,133		Platinum from placers			
<i>New South Wales</i> —				(c).....	45,577	42,381	35,793
Platinum from placers..	128	155	283	<i>Japan</i> —			
<i>Tasmania</i> —				Platinum from placers...	147	128	275
Osmiridium from placers.	1,360	953	1,280				
<i>New Zealand</i> —							
Platinum from placers....	7	3	1				
<i>Papua</i> (years ended June 30)							
Osmiridium from placers.	29	11	20				

(a) Information not available.

(b) Includes recoveries from imported materials.

(c) U.S. Bureau of Mines figures.

CHAPTER FIVE

MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics, Showing Production by Provinces, Imports, Exports, Prices and World Output Tables on Aluminium, Antimony, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Manganese, Mercury, Molybdenum, Radium, Tin, Titanium and Tungsten.

1. General Review

Metal-bearing minerals, mined or treated usually by a very few operators, have been grouped in this chapter for consideration as a single industry. The iron and steel industry is one of the larger and better organized in Canada; ores utilized in Canadian iron furnaces are imported either from the Mesabi range in Minnesota, U.S.A., or from the Wabana deposits on Bell Island, Newfoundland. Iron ores consisting of hematite, siderite and magnetite occur in rather extensive deposits in Canada. These ores are usually of lower grade than those imported and their utilization in the Canadian steel industry would necessitate the employment of beneficiation methods. The Canadian aluminium industry is also very important; the production of this metal in the Dominion comes entirely from the province of Quebec. Bauxite, the crude aluminium ore employed in the manufacture of Canadian made aluminium is mined in foreign countries.

This chapter also includes a review of the occurrences of antimony, chromium, manganese mercury, molybdenum, radium, tin and tungsten ores in Canada. The mining of these ores in Canada at the present time is relatively unimportant, and their future economic value will be largely determined by the existing demand and the extent of available supplies from other producing countries.

Some of these smaller industries have, in the past, attained considerable importance and it is probable that future technical research and industrial requirements may once again stimulate expansion in these and other undeveloped mineral fields.

For historical purposes and to provide the interested reader with available data, tables have been prepared for this report that set out the known facts regarding production in these industries.

During 1931 mining operations on properties included in the miscellaneous metal group, although limited in extent, were rather wide-spread in Canada. During the year the Indian Path mines conducted some development work at a tungsten mine in Lunenburg county, Nova Scotia. Manganese ores were shipped from properties in Nova Scotia and New Brunswick. Molybdenite ore was mined in Renfrew county, Ontario, and after concentration at the Mines Branch, Ottawa, was shipped to Germany. Chromite was not produced in 1932 and mining operations conducted by the Consolidated Mining and Smelting Company on chromite deposits in British Columbia were suspended early in the year. Antimony ore was exported for experimental purposes from the Lake George mine, York county, New Brunswick, and a small tonnage of ilmenite or titanium ore was mined and shipped from the Baie St. Paul district, Quebec. Argentiferous radium ores were under development at Echo Bay, Great Bear Lake, N.W.T., a shipment for testing purposes was made from these deposits. A small furnace was constructed at Barclay Sound, British Columbia, for the treatment of ores from the dump of the Canadian Quicksilver Company.

Table 106.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1930 and 1931

	1930			1931		
	Number of employees		Salaries and wages	Number of employees		Salaries and wages
	Male	Female	\$	Male	Female	\$
Salaried Employees—						
Total.....	12		21,771	3		5,954
Wage-Earners—						
Surface.....	81		{ 88,325	23		{ 19,740
Underground.....	19			6		
Mill.....	4					
Total.....	104		88,325	29		19,740
Grand Total.....	116		110,096	32		25,694

2. Commodity Statistics on Aluminium, Antimony, Beryllium, Bismuth, Cadmium, Calcium, Chromite, Iron Ore, Pig Iron, Ferro-Alloys, Steel and Rolled Products, Manganese, Mercury, Molybdenum, Radium, Tin, Titanium and Tungsten

ALUMINIUM

Aluminium ores have not yet been found in commercial quantities in Canada. Metallic aluminium has been produced from foreign ores by the Aluminum Company of Canada" at Shawinigan Falls, Quebec, since 1903. This same company constructed an additional aluminium reduction plant in 1926 at Arvida on the upper reaches of the Saguenay river. Bauxite ore, a hydrous aluminium oxide, used for the manufacture of aluminium in Canada, is mined principally in the United States, minor quantities of this mineral have also been obtained from British Guiana.

As there is only one Canadian company producing primary aluminium, statistics regarding the smelting operations have been included with data supplied by the smelters producing non-ferrous metals from Canadian ores. Production of aluminium hollow-ware, such as kitchen utensils, and other fabricated products, is reviewed annually in the Bureau's report on the Manufactures of the Non-Ferrous Metals.

Aluminium is a product of the electric furnace; alumina, which has been recovered by chemical means from bauxite, is dissolved in molten cryolite in the electric furnace; a low voltage current decomposes the oxide into metallic aluminium and oxygen, the metal sinking to the bottom of the crucible. All cryolite ore is obtained from Greenland. Aluminium, in addition to its use in the pure state, is alloyed with other metals including copper, nickel, cobalt, iron, antimony, tin, zinc, beryllium and magnesium. Pure aluminium powder is used in the thermit process to reduce the oxides of certain metals to the metallic state.

The World War gave a tremendous stimulus to aluminium production. In 1915 the world's aluminium output was 68,000 tons; in 1929 it reached 267,000 long tons with a recession to 262,000 tons in 1930 and 217,000 tons in 1931. According to the American Bureau of Metal Statistics the production of aluminium in the United States amounted to 80,500 metric tons in 1931 as compared with 103,890 tons in 1930.

Utilization of aluminium is increasing with remarkable rapidity. This metal and its alloys are now being employed in the construction of electrical transmission cable, motor car bodies and parts, railroad coaches, street cars, oil tanks, radio equipment, window frames, flooring, girders, aircraft, and a host of other metal manufactures.

The aluminium industry in 1931 strongly reflected the effect of world-wide economic conditions. Many organizations found it necessary to curtail production or close down plants. Construction on the Arvida works of "Aluminum Company of Canada" on the Saguenay River, Quebec, continued to some extent during 1931 and it is stated that this Company installed two 77,000 H.P. water wheel generators at its Chute a Caron plant.

Table 107.—Imports of Aluminium and its Products into Canada and Exports of Aluminium, 1929-1931

	1929		1930		1931	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Alumina.....	910,000	25,026	138,300	10,382	2,000,600	81,966
Bauxite ore.....	284,477,400	3,202,728	213,606,400	3,072,710	189,619,100	3,045,208
Cryolite ore.....	4,801,900	194,638	4,755,900	201,355	4,707,400	188,414
Aluminium—						
Ingots or blocks.....	317,091	76,411	159,611	39,609	333,315	65,568
Bars and rods.....	533,604	174,659	2,580,729	576,240	404,619	92,509
Sheets, strips or plates.....	701,353	220,357	1,213,604	344,009	1,441,465	353,420
Leaf or foil.....		197,164		233,375		128,670
Tubing.....	144,840	70,446	150,302	72,679	43,262	22,204
Household hollow-ware.....		393,577		372,132		203,962
Manufactures, n.o.p.....		1,482,288		1,373,781		1,011,644
Total.....		6,037,294		6,296,272		5,193,565
EXPORTS—						
Aluminium—						
Bars, blocks, etc.....	72,970,800	13,210,023	43,204,200	7,728,857	21,539,200	3,593,230
Kitchen utensils and hollow-ware.....		48,233		19,453		5,167
Scrap.....	3,416,200	455,326	2,750,600	381,408	3,730,200	393,766
Manufactures, n.o.p.....		1,430,927		1,800,712		503,014
Total.....		15,141,509		9,930,430		4,495,177

Table 108.—Estimated World Production of Aluminium, 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	1929	1930	1931
BRITISH EMPIRE			
United Kingdom.....	8,000	13,000	14,000
Canada.....	38,000	32,000	28,000
Total.....	46,000	45,000	42,000
FOREIGN COUNTRIES			
Austria.....	4,000	3,000	3,000
France.....	28,624	24,200	19,000
Germany.....	32,000	30,200	27,000
Italy (b).....	7,257	7,842	10,931
Norway (b).....	28,682	26,925	21,082
Russia (c).....	(a)	(c) 200	(a)
Spain.....	(b) 1,000	(b) 1,100	1,134
Switzerland.....	19,000	20,800	13,000
United States (b).....	100,450	102,248	79,261
Total.....	221,000	217,000	175,000
World's Total.....	267,000	262,000	217,000

(a) Information not available.

(b) Official figures.

(c) Year ended April 30, 1931.

Table 109.—World Production of Bauxite, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE—				FOREIGN COUNTRIES—			
Northern Ireland.....	2,322	2,037	3,340	France.....	655,824	598,835	342,452
British Guiana—				Germany.....	7,141	1,369	
60% or over alumina....	184,425	120,083	124,963	Greece.....	6,181	2,244	1,132
30 to 50% alumina.....	32,227	26,913	32,115	Hungary.....	383,006	31,195	84,379
India.....	9,044	2,514		Italy.....	189,729	158,641	66,305
Australia—				Jugoslavia.....	101,733	93,204	61,039
New South Wales.....			196	Roumania.....	911	667	375
(Victoria.....)	546	789	(a)	Russia (years ended			
Total.....	229,000	152,000	161,000	Sept. 30).....	(a)	12,000	(a)
				Spain.....	960	318	
				United States.....	365,777	330,612	195,895
				Dutch Guiana (exports)..	206,681	260,377	170,419
				Total.....	1,920,000	1,490,000	940,000
				World's Total.....	2,150,000	1,640,000	1,100,000

Information regarding Austrian production is not available.

(a) Information not available.

Table 110.—Production (Exports) of Cryolite from Greenland, 1927-1931

	Long tons
1927.....	23,820
1928.....	32,017
1929.....	29,310
1930.....	35,671
1931.....	17,427

ANTIMONY

Antimony bearing minerals are known to occur in British Columbia, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, and the Yukon. The greater part of the Canadian output of refined antimony was produced in the years 1907, 1909, 1915 and 1916 by the Consolidated Mining and Smelting Company at Trail, B.C.; the metal was recovered as a by-product in the treatment of silver-lead ores. The remainder of the Canadian antimony production came from deposits mined in Nova Scotia and New Brunswick.

A vein containing auriferous stibnite and native antimony associated with arsenopyrite, pyrite, and galena was mined at West Gore, Hants County, Nova Scotia, during the war period; the ore was milled at the property to yield a 38 to 45 per cent antimony concentrate. There has been no Canadian production of antimony since 1926.

Stibnite with small quantities of native antimony was discovered about 1850 in the slates and quartzites at Prince William, York county, New Brunswick. Local attempts to reduce the ore were failures, crude ore was then shipped until the property closed in 1890. During the late war period this ore was smelted and refined near Lake George. During 1931, 25 tons of antimony ore were shipped to Liverpool, England, from the Lake George mines, York county, New Brunswick. This shipment was made for experimental purposes.

Antimony ores are rare in the province of Ontario. Minerals containing this metal have been found in Hastings, Addington and Frontenac counties and in the silver ores of the Cobalt district. Antimony deposits have been partially developed in South Wolfe county, Quebec.

There are several occurrences of antimony in British Columbia. In the Bridge river area, Lillooet mining division, stibnite occurs in quartz; the ore here contains on the average, 40 to 60 per cent antimony and is free from arsenic, zinc and lead. A few shipments have been made from a deposit on the north fork of Carpenter creek in the Slocan district. Antimony has also been found on Graham Island, at Tatlayoko lake, Nanaimo district, and in the vicinity of Kamloops lake where it is associated with cinnabar.

In the Yukon Territory antimony ores occur in the Carbon and Chieftain hills near the Wheaton river.

Antimony is used in the manufacture of battery plates, grids, bearings, babbitt metal, solder, rubber goods, paints, fixtures, and for a variety of other purposes.

The low prices prevailing in 1930 and 1931 did not encourage antimony production in the higher cost countries. In China, always the leading source of supply, violent fluctuations in the price of silver, which is the standard of Chinese currency, interrupted production and shipments.

Table 111.—Production of Antimony in Canada, 1911-1931

Year	Antimony ore		Refined regulus		Antimony in silver-lead-bismuth bullion exported	
	Tons	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1911-1914.....						
1915.....	1,341	81,283	59,440	11,888		
1916.....	885	94,537	107,185	41,823		
1917.....	361	22,000				
1918-1924.....						
1925.....					1,751	206
1926.....					1,596	281
1927-1931.....						

(a) As recorded by the Nova Scotia Department of Mines : no value given.

NOTE.—For years 1886 to 1910 see previous reports.

Table 112.—Imports of Antimony into Canada, 1929-1931

	1929		1930		1931	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Antimony, or regulus of.....	1,746,525	147,643	1,303,560	87,027	919,724	56,458
Antimony salts, viz.: Tartar emetic, chloride and lactate (antimonine).....	58,829	8,703	14,168	2,862	3,178	482
Antimony salts for dyeing.....	220	119	6,978	829	46,017	2,763
Total.....		156,465		90,718		59,703

World Production of Antimony.—China is by far the greatest antimony-producing country in the world, and as consumption of antimony in that country is only 1 per cent of its production, large quantities are available for export. There are many valuable deposits in the various provinces of China, but in the province of Hunan alone there is said to be 2,000,000 tons, much of which has not been developed.

Table 113.—World Production of Antimony, 1929-1931

(In terms of metal)

(Supplied by *Imperial Institute*)

(Long tons)

Producing Country	1929	1930	1931	Producing Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—CON.			
Southern Rhodesia.....		34		Greece.....	67	66	268
India (ore).....	77	3		Italy.....	378	406	377
Canada (ore).....			22	Jugoslavia.....	156	2	40
Australia—				Mexico.....	2,667	2,984	5,357
New South Wales.....	25	67	65	Bolivia (exports).....	3,719	1,141	1,327
Victoria.....	2		(a)	Peru.....	106	60	(a)
FOREIGN COUNTRIES				China.....	18,457	16,917	18,320
Austria.....	700			Turkey.....	11	34	21
Czechoslovakia.....	684	378	556	Japan.....			1
France.....	1,909	1,220	700	World's Total.....	29,000	23,000	27,000

(a) Information not available.

BERYLLIUM

Shipments of beryl crystals were made to Germany in 1927 from a deposit in Lyndoch township, Renfrew county, Ontario. Beryl occurrences in the pegmatites of eastern Manitoba have been investigated during recent years. Beryllium is a steel-grey metal, it easily tarnishes in air and shows a complete lack of ductility at ordinary temperatures. The density is 1.84 or less than that of aluminium. A remarkable property of beryllium, and one which has already been put to extensive practical use, is the fact that it is remarkably transparent to X-rays.

There are three principal groups of beryllium alloys: those with aluminium, those with copper, and those with iron. The presence of beryllium confers a corrosion resisting property to silver and it is reported that attempts will be made to use this alloy as a true "Stainless silver." Beryllium copper alloys have a fairly high conductivity and are substantially stronger than copper in the pure state. Various patents have been taken out covering certain of the iron-beryllium alloys. There is, at present, no production of beryllium ores in Canada. Beryllium is now being produced on a small scale in both the United States and Germany; German producers quote in 1931 prices of \$85 per pound for 98 per cent metal and \$300 per pound for 99.5 per cent metal.

BISMUTH

Bismuth occurs in small quantities with ores of the Cobalt district and in ores treated at the Trail smelter in British Columbia. In 1931, 118,207 pounds of bismuth were contained in a silver-lead-bismuth bullion exported for treatment in the United States; and in metal produced at Trail, B.C., by the Consolidated Mining and Smelting Co., Ltd., this was valued at \$157,650.

The chief uses of bismuth are in the manufacture of pharmaceutical chemicals and in low melting alloys. It has been recently suggested that great possibilities exist for the adoption of this metal in solder and sheathing for telephone and telegraph cables.

The chief producers of bismuth are the United States, Bolivia and Spain, with smaller amounts from Japan and Peru; several other countries produce minor amounts. A large proportion of the metal, particularly in the United States and Peru, is recovered as a by-product in lead and copper smelting; bismuth ores are mined in Bolivia and Spain.

Table 114.—World Production of Bismuth, 1929-1931

(Supplied by Imperial Institute)

(Cwt.—112 pounds)

Producing Country and Description	1929	1930	1931
BRITISH EMPIRE			
Canada—(metal).....	1,735	114	1,056
India—(ore).....	lb. 88	1	lb. 42
Australia—(ore, etc.).....	67	83	792
FOREIGN COUNTRIES			
Czechoslovakia—ore (Bi content).....	75		
Germany (Saxony)—(Bismuth-cobalt-nickel ore).....	940	2,342	1,299
Spain—(ore).....	2,323	1,319	2,244
(metal).....	219	632	531
Argentina—(ore).....	145		
Bolivia (exports)—(Content of ore and concentrates).....	2,974	1,219	523
Peru—ore (bi-content).....	613	2,441	5,532
China—(ore.).....	4,320	3,140	2,620
Japan—(metal).....	984	1,079	1,115

Bismuth was also recovered as a by-product in the refining of lead and zinc in the United States.

CADMIUM

Cadmium was produced in Canada for the first time in 1928 at the Trail refinery of the Consolidated Mining and Smelting Company Limited as a by-product in the refining of zinc.

The principal sources of the world's cadmium are the electrolytic zinc plants of the Anaconda Copper Mining Company in the United States, the Electrolytic Zinc Corporation of Australasia at Risdon, Tasmania, and the Consolidated Mining and Smelting Company of Canada at Trail, British Columbia.

Principal cadmium importing countries are the United Kingdom, France, Poland and the United States.

Cadmium produced in British Columbia as a by-product in the production of refined zinc at the Trail refinery of the Consolidated Mining and Smelting Company was valued at \$180,958 in 1931 as compared with a value of \$337,871 in 1930. The Hudson Bay Mining and Smelting Company produced and stored 2,166 tons of cadmium precipitate; this contained 2.49 per cent cadmium. This product, produced in the zinc plant, will be treated in 1932. Cadmium has obtained a strong position as a plating metal, especially in the automobile industry; the metal is also used in silver, gold, copper and fusible alloys and in the manufacture of pigments. Cadmium compounds such as the chloride, iodide, bromide, and nitrate, find various uses in the chemical industries.

Table 115.—World Production of Cadmium, 1929-1931

(Supplied by *Imperial Institute*)

(Lb. avdp.)

Country	1929	1930	1931
BRITISH EMPIRE			
Canada.....	773,976	456,600	323,139
Australia.....	445,907	509,598	445,158
FOREIGN COUNTRIES			
Belgium (exports).....	5,100	11,200	6,400
France.....	130,000	150,000	181,167
Germany (estimated).....	100,000	100,000	(a)
Italy (estimated).....	(a)	26,500	26,500
Poland.....	7,901	(a)	(a)
United States—			
Metal.....	2,481,427	2,777,762	1,050,529
Compounds (metal content).....	433,300	316,300	337,200
Mexico (b).....	1,413,092	1,207,564	70,175

NOTE:—Cadmium is also produced in Russia and Sweden but statistics are not available.

(a) Information not available.

(b) Recorded as cadmium but probably zinc-cadmium fume sent to the United States for treatment.

CALCIUM⁽¹⁾

Metallic calcium is now available in tonnage quantities and is finding a number of uses which are both unusual and interesting. Three of the most important uses that have been made of this metal are as a deoxidizer and degasifier in the casting of other metals, as a re-agent in the removal of bismuth from lead and as a hardener of soft metals, particularly lead. Metallic calcium is produced commercially by the electrolysis of fused calcium chloride; the quantities of calcium sold during recent years has been from 25 to 40 tons; the chief source of supply is France. Current price of the metal is about \$1.50 per pound.

CHROMIUM

The mineral chromite (FeO , Cr_2O_3) is the commercial source of the metal chromium which is of prime importance in the manufacture of chrome steel armour plate and other similar steels. Chromium is a necessary constituent of many high-speed cutting tools, and its use is well established in the manufacture of stainless steels, in which it makes up from 12 to 14 per cent or higher of the alloy.

(1) The Mineral Industry.

A considerable quantity of the chromite produced is used in the manufacture of chromite refractories such as brick and other furnace linings, and in the manufacture of chemicals.

There was no production of chromite in Canada during 1931. Mining operations conducted by the Consolidated Mining and Smelting Company on the Flint chromite claims near Ashcroft, British Columbia, were suspended early in the year. A claim with favourable surface indications adjoining the Flint was acquired by the company. Chromite also occurs in Ontario and Quebec and for several years there was a considerable tonnage of this mineral produced from deposits in the Eastern Townships of the latter province. The Rhodesian Chamber of Mines reports an output of 89,974 tons of chrome ore in Southern Rhodesia as compared with 226,671 tons in 1930. The Economic Review of the Soviet Union reports that since the inauguration of the Five Year Plan, due both to increased domestic consumption and to the development of exports, Russian chromite production has advanced at an exceptional rate, and present indications are that a steady increase in output will be maintained—the Soviet chromite production for 1929-1930 totalled 66,720 metric tons and constituted 10·8 per cent of the world output. The Soviet union states that the Russian chromite production is now double the pre-war level.

Recent decreases in the production of alloy steel ingots and castings reflect a decline in the world consumption of ferrochromium. This, however, has been offset to some extent by an increased output of high chromium alloys such as the "18-8" (18 per cent chromium and 8 per cent nickel).

Table 116.—Production of Chromite in Canada, 1922-1931

Year	Short tons	Value
1922.....	767	\$ 11,503
1923.....	3,558	52,650
1924-1928.....		
1929.....	126	900
1930.....		
1931.....		

NOTE:—For years 1886 to 1921 see previous reports.

Table 117.—Production in Canada of Chromite, and Imports of Chromium Products, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION.....	126	\$ 900		\$		\$
IMPORTS—						
Bichromate of soda.....	898	127,828	985	142,041	805	114,793
Bichromate of potash.....	84	14,955	40	7,383	65	11,656
Brick, fire, chrome.....		101,302		73,761		48,230
†Chrome steel.....	3,510	220,890	2,234	123,335		

†January 1 to March 31, 1930.

Table 118.—World Production of Chrome Ore, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Southern Rhodesia.....	261,711	202,385	89,334	Russia (years ended Sept.			
Union of South Africa.....	62,964	13,508	22,966	30).....	28,000	65,028	(a)
Cyprus.....	2,444	1,544	200	Cuba.....	39,760	(b) 40,982	8,959
Canada.....	113			United States.....	543	310	268
India.....	49,565	50,684	19,913	Brazil (exports).....	69	10	
Australia.....	129	168	26	French Indo-China.....		1,500	1,400
Total.....	377,000	268,000	123,000	Japan.....	9,000	11,169	9,573
FOREIGN COUNTRIES				Turkey.....	14,840	27,879	29,059
Greece.....	23,832	23,032	5,545	New Caledonia.....	51,800	61,000	62,000
Jugoslavia.....	42,343	50,583	56,238	Total.....	210,000	280,000	(a)
				World's Total.....	590,000	550,000	(a)

(a) Information not available.

(b) Imports into the United States.

IRON ORE

Iron ore was first discovered in Canada in the St. Maurice valley, Quebec, as early as 1667, or perhaps earlier. Court Frontenac mined ore there five years later and the samples, tested in France, were found to be of workable quality.

In 1730 M. Franchville was granted a licence by Louis XIV of France together with a subsidy of 10,000 "livres" to work the St. Maurice iron mines. The project contemplated the construction of a blast furnace which apparently was not successful, for, in 1735, he surrendered his rights to the government. Some years later another licence and a subsidy were given La Compagnie des Forges which made not only the iron kettles that were needed by the pioneers for making sugar and soap but furnished the French government with cannon for military enterprises. In 1743 the plant again reverted to the crown and was operated by the government until the country passed into the hands of the British.

Nova Scotia with its large iron and steel industry is not at present a producer of iron ore. Deposits of iron ore of various kinds are numerous throughout a large part of the province, Nova Scotia ranks next to Ontario in the matter of total production, however the large deposits of high-grade iron ore in Newfoundland owned and operated by the British Empire Steel Corporation, are much more readily accessible and of a higher and more constant grade than the deposits in Nova Scotia and for that reason the local deposits are not mined.

Iron ore mining and smelting were carried on to a small extent in New Brunswick but the ore was low-grade and the operations did not prosper.

Iron ore was first mined and smelted in the province of Quebec early in the eighteenth century, and from that time un'til 1883 the industry was carried on almost continuously at Three Rivers in the St. Maurice district. Other furnaces using local ore were operated at Radnor Forges and at Drummondville, the last to shut down being the Drummondville furnace in 1911. The ores used were bog ores, with charcoal for fuel. The output of all the furnaces was small and the industry owed its success to the superior quality of the pig iron produced.

Furnaces have also been built at various times and places in attempts to smelt some of the other classes of ore found in the province, these were all short lived, and none achieved commercial success.

In northwestern Ontario about 1899, a deposit of hematite, that later developed into the Helen mine, was found, this mine proved the main source of Ontario's iron output for a number of years. The high grade ore was exhausted and the mine is now closed down. Ontario has a large supply of low-grade iron ore, but beneficiation processes must be applied to make these ores suitable for commercial use.

Production of iron ore in British Columbia has been almost negligible up to the present time, however, the small production has not been caused so much by the lack of ore as by the scarcity of a market for the ore.

For the past four years the Department of Mines at Ottawa has been conducting an active investigation of the various sponge iron processes and the suitability of various Canadian ores for making sponge iron. Among the various Canadian ores treated up to the present time in the ore testing laboratories at Ottawa, the most promising is that from Texada Island, British Columbia. These deposits are fairly large, all near the shore and accessible. The iron content is 60 to 65 per cent. The recent shipment of ore to Ottawa from these deposits was of the following composition: Iron 62.06 per cent; sulphur 0.15 per cent; phosphorous 0.056 per cent; copper 0.045 per cent; silica 8.41 per cent.

Table 119.—Shipments of Iron and Titanium Ores from Canadian Mines, by Provinces, 1922-1931

(For years 1886 to 1921 see Mineral Production of Canada, 1928)

(Short tons)

Year	Quebec	Ontario	British Columbia	Canada
1922.....	526	16,190	1,255	17,971
1923.....	69	30,447	243	30,759
1924.....	1,408	44	28	1,480
1925*.....	3,978			3,978
1926.....	200			200
1927.....	2,029			2,029
1928.....	2,244			2,244
1929.....	2,748			2,748
1930.....	412			412
1931.....	1,509			1,509

*1925-1931—shipments consist of titaniferous ore.

Table 120.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1922-1931

(For years 1895 to 1921 see Mineral Production of Canada, 1928)

Year	To Nova Scotia	To United States	To Europe	Total shipments
	Short tons	Short tons	Short tons	Short tons
1922.....	311,482		811,845	1,123,327
1923.....	451,483		356,753	808,236
1924.....	174,602		919,968	1,094,570
1925.....	384,795		883,056	1,267,851
1926.....	465,961		503,640	969,601
1927.....	480,757	68,354	946,569	1,495,680
1928.....	690,316	41,493	1,001,833	1,733,642
1929.....	763,168	85,501	850,370	1,699,039
1930*.....	523,918	54,623	740,774	1,319,315
1931.....	234,148	25,670	530,079	789,897

* European shipments in 1930 were to Germany only.

Table 121.—Imports into Canada, and Exports of Iron Ore, 1930 and 1931

	1930		1931	
	Quantity	Value	Quantity	Value
	Short tons	\$	Short tons	\$
IMPORTS—				
Iron ore from United States.....	867,344	2,103,170	551,166	1,233,254
Iron ore from Newfoundland.....	583,834	1,053,020	230,851	440,301
Iron ore from Sweden.....	34,251	168,000		
Iron ore from other countries.....			26,403	44,888
Total.....	1,485,429	3,324,190	808,420	1,718,443
EXPORTS—Total.....	558	3,025	1,555	5,192

Table 122.—World Production of Iron ore (including Manganiferous Iron Ore)

(Supplied by Imperial Institute)

(Long tons)

Country	Ore			Estimated iron content		
	1929	1930	1931	1929	1930	1931
BRITISH EMPIRE						
Great Britain.....	13,214,943	11,627,233	7,625,860	3,964,483	3,604,442	2,364,017
Northern Ireland.....	689			200		200
Northern Rhodesia.....	3,556	9	759	900	2	
Southern Rhodesia.....	3,352	2,484	526	850	600	150
S. W. Africa.....	28,244	39,338	21,863	(a)	(a)	(a)
Union of South Africa.....	37,666	50,846	15,203	16,419	25,866	5,911
Newfoundland.....	1,494,452	1,450,123	587,210	777,000	754,000	305,000
India.....	2,428,555	1,849,625	1,624,883	1,550,000	1,180,000	1,040,000
Unfederated Malay States—						
Johore.....	743,209	702,801	691,991	475,654	449,793	441,000
Trengganu.....	66,309	74,984		41,800	47,200	
Australia.....	852,960	936,609	297,651	563,000	618,000	196,000
New Zealand.....	8,043	16,150	6,920	4,300	8,800	3,800
Total.....	18,900,000	16,800,000	10,900,000			
FOREIGN COUNTRIES						
Austria.....	1,861,509	1,161,808	503,859	587,898	388,780	178,475
Belgium.....	153,211	128,921	(a)	69,000	58,000	(a)
Czechoslovakia.....	1,779,113	1,626,814	1,215,572	573,788	522,705	388,153
France.....	49,929,873	48,049,473	38,171,666	18,000,000	17,000,000	13,000,000
Germany.....	6,272,546	5,648,219	2,579,900	2,047,404	1,816,193	828,243
Greece.....	249,031	252,115	232,289	121,339	119,467	102,100
Hungary.....	247,736	154,935	82,706	(a)	(a)	(a)
Italy (b).....	710,606	717,849	565,675	326,077	352,916	275,200
Jugoslavia.....	421,186	424,378	131,009	232,000	233,000	72,000
Luxemburg.....	7,451,629	6,544,354	4,689,671	2,251,137	1,967,233	1,434,296
Norway.....	734,328	760,224	565,807	481,436	498,467	372,232
Poland.....	649,151	469,610	280,000	181,663	131,000	73,000
Portugal.....	11,580			6,250		
Roumania.....	88,592	91,056	60,929	39,000	40,000	27,000
Russia.....	7,724,700	10,260,000	10,444,600	(a)	(a)	(a)
Spain.....	6,455,471	5,437,519	3,139,818	3,134,700	2,570,000	1,480,000
Sweden.....	11,286,437	11,058,964	6,959,193	6,842,000	6,740,000	4,259,000
Switzerland (exports).....	87,048	100,316	33,698	(a)	(a)	(a)
Algeria.....	2,161,514	2,196,619	1,000,896	1,080,748	1,098,310	500,000
Belgian Congo.....	50,000	55,000	19,000	(a)	(a)	(a)
Morocco (Spanish).....	1,227,357	(a)	(a)	663,000	(a)	(a)
Tunis.....	958,000	815,000	439,500	500,000	430,000	230,000
Cuba (shipments).....	671,320	187,264	90,947	377,000	105,000	52,300
Mexico.....	(a)	(a)	64,127	(a)	(a)	(a)
United States (b).....	74,215,978	59,194,054	31,412,916	37,000,000	29,600,000	15,700,000
Brazil (estimated).....	30,000	30,000	30,000	20,000	20,000	20,000
Chile.....	1,783,807	1,693,349	701,000	1,177,313	1,117,611	465,000
China.....	2,630,200	2,225,500	2,206,800	(a)	(a)	(a)
Japan.....	175,000	242,106	(a)	(a)	(a)	(a)
Korea.....	550,386	572,769	(a)	308,000	321,000	(a)
Turkey.....			492			(a)
Total.....	181,000,000	161,000,000	108,000,000			
World's Total.....	200,000,000	178,000,000	119,000,000			

(a) Information not available.

(b) Includes some manganiferous iron ore up to 30% Mn.

PIG IRON AND FERRO-ALLOYS, STEEL AND ROLLED PRODUCTS

Statistics of pig iron, steel and rolled products, are regarded as belonging to "Manufactures" rather than to "Mining" but the close relation between the mining of iron ore and the production of pig iron and steel justifies the inclusion here of references to these secondary industries. The data given in this section have been taken from the Bureau's annual bulletin on *The Primary Iron and Steel Industry in Canada, 1931*.

The primary iron and steel industry covers the operations of plants engaged chiefly in the manufacture of (a) pig iron, (b) ferro-alloys, (c) steel ingots and direct steel castings, (d) rolled and drawn iron and steel products, such as bars, strips, plates, sheets, rails, wire rods, structural shapes, etc. Figures for 1931 include data for one plant which produced cold rolled steel bars and strips, and two which made cold drawn steel shapes; formerly these concerns were classified in the castings and forgings group.

Factory sales from this industry in 1931 were valued at \$36,911,245 which was 30 per cent under the sales figure for 1930 and the lowest total reported for any year since 1925.

Thirty-seven firms in this group in 1931 operated 53 different plants or departments including 4 pig iron, 2 ferro-alloy, and 28 steel plants and 19 rolling and drawing mills. The 22 works in Ontario accounted for 59 per cent of the total sales for Canada, 6 in Nova Scotia took care of 22 per cent, 14 in Quebec, 15 per cent, while the remaining 4 per cent was accounted for by 4 plants in Manitoba, 4 in British Columbia, and 3 in Alberta.

Capital employed in 1931 was given at \$104,512,104, a decline of 7.5 millions from 1930. Over 70 per cent of this total or \$73,945,195 represented the value of lands, buildings and equipment.

The average number of employees was 8,026 as compared with 9,723 in 1930 and 11,218 in 1929. About 632 workers were employed in iron blast furnace departments, 195 in ferro-alloy plants, 2,945 on steel furnaces, and 4,254 in rolling mills. Salaries and wages for the year totalled \$11,072,054 as compared with \$14,934,325 in 1930.

(a) **Pig Iron.**—Production of pig iron in Canada during 1931 totalled 420,038 long tons as compared with 747,178 tons in 1930, 1,080,160 tons in 1929, and 1,037,727 tons in 1928.

Imports of pig iron during 1931 amounted to 7,912 long tons, a decline of 42 per cent from the total of 13,643 tons brought in during 1930. Exports were recorded at 2,787 long tons as compared with 593 in the previous year.

Furnace charges in 1931 included 745,951 long tons of imported ore, 56,525 long tons of mill cinder, etc., 16,272 long tons of scrap, 224,786 short tons of limestone, and 448,845 short tons of coke.

The stocks of pig iron held by the producers at the end of 1931 totalled 128,222 long tons.

The 4 producing companies had 11 blast furnaces available for use which, if operated at capacity, could produce 1.5 million tons of pig iron per year. Actual production totalled 420,038 tons so the furnaces were worked only at about 28 per cent of the rated capacity over the yearly period. For the first seven months the average rate was at about 39 per cent of capacity but for the last five months operations were at the rate of only 13 per cent of capacity.

(b) **Ferro-Alloys.**—Production of ferro-alloys in Canada during 1931 amounted to 46,764 long tons as compared with 65,223 long tons in 1930 and 89,116 tons in 1929. This year's output included ferromanganese, ferrosilicon and spiegeleisen.

Eight firms made ferro-alloys in 1931, including 4 abrasive manufacturers who made ferro-silicon as a by-product, 1 pig iron producer who also made spiegeleisen, 1 steel producer who made some ferrisilicon and 2 concerns which were solely engaged in making ferro-alloys.

(c) **Steel Ingots and Direct Steel Castings.**—Production of steel ingots and direct steel castings totalled 672,109 long tons, a decline of 33 per cent from the 1930 output of 1,009,578 tons. This year's output included 637,454 tons of ingots and 34,655 tons of direct castings. All of the ingots were transferred to the producing companies' own plants while only 3,461 tons of castings were for the producers' own use. Sales of direct castings were reported at 30,831 tons, the difference between the tonnage distributed and the tonnage made representing a slight increase in stocks.

Of the 28 steel plants, 10 were in Quebec, 7 in Ontario, 4 in British Columbia, 3 in Manitoba, 2 in Nova Scotia and 2 in Alberta. Five of these works operated basic open hearth furnaces only, 18 had electric furnaces only, 2 used both basic open hearth and electric furnaces, and 3 used converters. Five concerns made basic steel ingots, 3 made electric ingots, 18 made electric steel castings, 4 made basic open hearth castings, and 3 made converter castings.

(d) **Rolled and Drawn Steel.**—Sixteen plants made hot rolled products, 1 made cold rolled shapes and 2 produced cold drawn shapes in 1931. Sales from these factories were valued at \$27,279,916 as compared with \$36,995,287 in 1930 and \$50,758,322 in 1929. During the year about 801,787 tons of iron and steel passed through the mills and 693,152 tons of this came from the producers' own steel works.

Ten of the mills were in Ontario, 4 in Quebec, 3 in Nova Scotia, and 1 in each of Manitoba and Alberta.

Tables 123.—Principal Statistics of the Primary Iron and Steel Industry in Canada, 1926-1931

Year	No. of plants	Capital employed	Average number of employees	Salaries and wages	(*) Cost of materials at works	Selling* value of products at works	Value added by manufacturing
		\$		\$	\$	\$	\$
1926.....	33	86,987,454	6,140	9,054,170	19,912,723	41,183,565	21,270,842
1927.....	36	96,295,734	7,396	11,809,198	18,993,940	45,571,264	26,577,324
1928.....	40	114,292,363	9,057	15,470,836	27,164,463	62,071,674	34,907,211
1929.....	45	109,446,529	11,218	18,534,681	32,514,596	72,231,995	39,717,399
1930.....	49	112,079,926	9,723	14,934,325	22,765,648	52,588,935	29,823,287
1931.....	53	104,512,104	8,026	11,072,054	15,291,414	36,911,245	21,619,831

*Figures of materials used are of purchased materials only, and production figures cover sales only.

Table 124.—Principal Statistics of the Pig Iron and Ferro-Alloys, Steel and Rolled Products Industry in Canada, by Provinces, 1930 and 1931

Province	Year	Number of plants	Capital employed	Number of employees	Salaries and wages	Cost of materials	Production	Value added by manufacturing
			\$		\$	\$	\$	\$
Nova Scotia.....	1930	6	21,508,717	1,974	2,572,564	5,702,836	11,814,234	6,111,398
	1931	6	18,430,500	1,849	1,880,158	3,427,289	8,215,412	4,788,123
Quebec.....	1930	13	16,964,961	2,179	2,999,077	2,288,934	8,190,360	5,901,426
	1931	14	12,753,170	1,770	2,205,216	1,770,846	5,408,500	3,637,654
Ontario.....	1930	19	70,544,399	4,958	8,708,854	14,329,688	30,655,496	16,325,808
	1931	22	70,243,562	3,894	6,450,204	9,674,663	21,696,418	12,021,755
Manitoba.....	1930	4	1,842,849	390	435,597	321,411	1,341,907	1,020,496
	1931	4	1,826,872	341	348,875	268,808	999,268	730,460
Alberta.....	1930	3	1,093,000	168	135,200	71,983	369,780	297,797
	1931	3	1,130,000	122	125,600	116,881	444,600	327,719
British Columbia.....	1930	4	126,000	54	83,033	50,796	217,158	166,362
	1931	4	128,000	50	62,001	32,927	147,047	114,120
Canada.....	1930	49	112,079,926	9,723	14,934,325	22,765,648	52,588,935	29,823,287
	1931	53	104,512,104	8,026	11,072,054	15,291,414	36,911,245	21,619,831

Table 125.—Materials Charged to Iron Blast Furnaces in Canada, 1931

Item	Quantity	Cost at furnace
		\$
Foreign iron ore.....long tons	745,951	2,896,179
Mill cinder, scale, slags, etc.....long tons	56,525	184,658
Scrap.....long tons	16,272	147,180
Limestone—		
From Canadian quarries.....short tons	68,868	102,776
From foreign sources.....short tons	155,918	194,807
Coke—		
From Canadian coal.....short tons	116,880	686,355
From imported coal.....short tons	301,477	1,656,332
Imported coke.....short tons	30,488	176,839
Firebrick.....M	12	648
Fire clay.....short tons	168	896
Other materials.....		6,011
Total.....		6,052,681

Table 126.—Production and Sales of Pig Iron in Canada, by Grades, 1931

Item	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Pig Iron—				
Basic.....	311,850	309,650	6,365	107,693
Foundry.....	80,892	1,128	97,183	1,810,101
Malleable.....	27,296	5,669	36,072	695,717
Total.....	420,038	316,447	139,620	2,613,511

Table 127.—Production of Ferro-Alloys in Canada, 1922-1931

	Long tons		Long tons
1922.....	21,602	1927.....	56,230
1923.....	41,887	1928.....	44,482
1924.....	35,034	1929.....	89,116
1925.....	25,709	1930.....	65,223
1926.....	57,060	1931.....	46,764

Table 128.—Materials Used in the Steel Ingots and Direct Steel Castings Industry in Canada, 1931

Item	Unit of measure	Companies' own production	Purchased materials	
			Quantity	Cost at furnace
				\$
Metals:—				
Pig iron.....	long ton	319,150	8,913	194,276
Spiegeleisen and ferromanganese.....	long ton		6,339	355,699
Ferrosilicon.....	long ton		2,965	156,119
Other ferro-alloys.....	long ton			108,113
Metals for making alloy steels (nickel, etc.).....	long ton		157	33,760
Scrap iron or steel, including old rails not intended for re-rolling.....	long ton	4,792	241,830	2,950,255
Scrap, made in works reporting.....	long ton	154,828		
Total metals.....				3,798,222
Ores:—				
Crude iron ore:—				
Foreign.....	long ton		30,813	201,723
Calcined, roasted or treated ore—Foreign.....	long ton		123	1,793
Canadian.....	long ton		55	492
Manganiferous ore:—				
Foreign.....	long ton		1,116	20,702
Canadian.....	long ton		36	2,130
Chrome, etc.:—				
Foreign.....	long ton		383	9,220
Total ores.....	long ton		32,529	236,060
General materials:—				
Limestone—Canadian.....	short ton		30,140	74,355
Foreign.....	short ton		44,384	57,147
Fluorspar.....	short ton		4,969	66,471
Dolomite.....	short ton		15,773	76,317
Coke from Canadian coal.....	short ton		974	11,123
Coke made in Canada from imported coal.....	short ton		316	3,106
Imported coke.....	short ton		840	8,400
Anthracite coal.....	short ton		480	4,295
Bituminous coal.....	short ton		110	920
Charcoal.....	short ton		396	11,214
Electrodes.....				120,068
Moulding sands.....	short ton		12,816	46,415
Firebrick.....	short ton		2,948	43,590
Fireclay.....	short ton		2,096	18,630
Other materials.....				210,100
Total general materials.....				752,151
Total value of all metals, ores and general materials.....				4,786,433

Table 129.—Products* of the Steel Ingots and Castings Industry in Canada, 1931

Item	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Steel Ingots:—				
Basic open hearth.....	612,437	613,402		
Electric.....	25,017	25,017		
Direct Steel Castings:—				
Basic.....	14,760	3,348	11,057	1,712,865
Bessemer.....	590	100	490	106,253
Electric.....	19,305	13	19,284	3,324,377
Total.....	672,109	641,880	30,831	5,143,495

*Production figures as given herein do not necessarily represent the total Canadian output; there may be also a small production in other industrial groups.

Table 130.—Materials used in the Rolled Iron and Steel Products Industry in Canada, 1931

Item	Companies' own make	Purchased materials	
		Quantity	Cost at mill
	Long tons	Long tons	\$
Steel, crude and semi-finished (ingots, blooms, billets, slabs).....	684,999	57,266	2,242,551
Rails, old or scrap.....		36,269	646,667
Iron muck and scrap bar.....	2,400	157	10,658
Iron and steel scrap.....	3,639	1,000	9,859
Axles, scrap.....		6,266	112,356
All other iron and steel.....	2,114		
Steel bars and rods for cold rolling or drawing.....		7,687	424,024
All other materials.....			85,461
Total.....			3,531,576

Table 131.—Products Made in the Iron and Steel Rolling and Drawing Mills, and Sales by the Producers, 1931

Products	Total tonnage made	Tonnage shipped to companies own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Blooms, billets and slabs (except for forging).....	484,437	483,380	50,499	1,601,299
Rails.....	140,145	148	135,975	6,238,208
Structural shapes.....	33,867	600	32,010	1,627,545
Merchant bars, including spring steel rounds, squares, flats (6 in. and under) except flats for cold rolling and bars for reinforcing concrete.....	102,247	21,513	87,442	4,582,465
Bars for reinforcing concrete.....	50,296	1,985	51,280	2,613,431
Wire rods, including chain rods.....	78,133	61,081	18,389	726,442
Spike rods, bolt and nut rods, horseshoe bars, and all other miscellaneous rolled (not forged) forms, not elsewhere specified.....	26,959	20,808	6,246	312,144
Cold rolled and cold drawn steel shapes.....	7,802		7,802	676,512
Rail fastenings, finished—				
Tie plates.....	30,402	4	31,661	1,691,098
Angle splice bars and fish plates.....	8,616	5	9,357	591,407
Forgings of iron or steel.....	11,512		12,827	1,085,340
Railway spikes and pressed spikes.....	8,461	153	8,670	606,522
Washers.....	369	65	327	44,926
Scrap iron and steel.....	4,282	520	2,574	21,423
Other products including plain sheets, plates, galvanized sheets, forged axles, horseshoes, etc., for which figures cannot be shown separately.....				4,861,154
Total.....				27,279,916

Table 132.—Production of Pig Iron in Canada, by Provinces, 1926-1931
(Long tons)

Year	Nova Scotia	Ontario	Total
1926.....	250,238	507,079	757,317
1927.....	249,549	460,148	709,697
1928.....	302,756	734,971	1,037,727
1929.....	310,801	769,359	1,080,160
1930.....	212,636	534,542	747,178
1931.....	101,393	318,645	420,038

Table 133.—Production of Pig Iron in Canada, by Grades, 1926-1931
(Long tons)

Year	Basic	Foundry	Malleable	Total
1926.....	469,630	243,307	44,380	757,317
1927.....	523,701	145,787	40,209	709,697
1928.....	724,559	233,386	79,782	1,037,727
1929.....	770,478	221,644	88,038	1,080,160
1930.....	494,231	193,074	59,873	747,178
1931.....	311,850	80,892	27,296	420,038

Table 134.—Production of Pig Iron in Canada, by Months, 1929-1931
(Long tons)

Month	1929	1930	1931	Month	1929	1930	1931
January.....	87,764	87,079	35,592	August.....	112,528	57,459	23,212
February.....	93,939	70,600	46,395	September.....	98,816	49,395	17,585
March.....	86,176	74,582	57,110	October.....	91,409	40,079	11,562
April.....	79,341	72,339	53,792	November.....	86,516	46,360	14,292
May.....	81,464	80,505	50,511	December*.....	72,548	38,023	13,862
June.....	89,873	66,081	55,822	Total.....	1,080,160	747,178	420,038
July.....	99,786	64,676	40,303				

*Slight errors in monthly production figures have been compensated in December totals.

Table 135.—Production of Steel Ingots and Direct Steel Castings in Canada, by Kinds, 1926-1931
(Long tons)

Year	Steel ingots		Direct steel castings			Total steel ingots and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1926.....	744,103	.....	19,831	1,676	10,652	776,262
1927.....	868,440	134	17,569	2,191	19,611	907,945
1928.....	1,189,399	602	20,109	2,019	22,590	1,234,719
1929.....	1,295,162	14,444	35,806	2,590	30,022	1,378,024
1930.....	925,427	31,461	24,772	2,314	25,604	1,009,578
1931.....	612,437	25,017	14,760	590	19,305	672,109

Table 136.—Production of Steel Ingots and Castings in Canada, by Months, 1929-1931
(Long tons)

Month	1929	1930	1931	Month	1929	1930	1931
January.....	116,260	115,200	57,598	August.....	120,282	57,626	52,491
February.....	117,445	106,612	82,637	September.....	99,000	55,808	33,390
March.....	137,158	117,487	99,341	October.....	115,674	65,431	30,926
April.....	122,102	102,681	91,461	November.....	93,648	71,740	28,337
May.....	126,372	99,312	75,235	December*.....	80,751	53,936	19,991
June.....	119,505	95,321	55,605	Total.....	1,378,024	1,009,578	672,109
July.....	129,827	68,424	45,097				

*Slight errors in monthly production figures have been compensated in December totals.

Table 137.—World Production of Pig Iron, 1929-1931

(Including ferro-alloys)
(Supplied by *Imperial Institute*)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom.....	7,589,300	6,192,400	3,772,600	Jugoslavia.....	30,397	34,458	37,166
Union of S. Africa.....	16,249	29,255	8,799	Luxemburg.....	2,860,195	2,433,852	2,020,672
Canada.....	1,169,276	812,401	466,802	Netherlands.....	249,768	268,411	252,662
India.....	1,395,171	1,179,868	1,072,418	Norway.....	150,972	142,549	(a)
Australia (c).....	330,000	440,000	380,000	Poland.....	694,389	470,399	341,632
New Zealand.....	4,393	8,075	3,460	Roumania.....	71,203	67,756	25,485
Total.....	10,500,000	8,700,000	5,700,000	Russia.....	4,278,100	4,921,500	4,778,800
FOREIGN COUNTRIES				Spain.....	740,732	612,069	471,646
Austria.....	451,724	292,136	142,726	Sweden.....	515,556	488,570	410,912
Belgium.....	3,976,715	3,312,091	3,180,542	Mexico.....	59,279	56,913	52,090
Czechoslovakia.....	1,618,542	1,414,392	1,146,331	United States.....	42,613,983	31,752,169	18,426,354
Finland.....	10,508	10,215	12,134	Brazil.....	33,176	34,422	(a)
France:—				Japan (b).....	1,536,783	1,660,779	1,385,959
Saar.....	2,071,695	1,882,240	1,491,495	Manchuria.....	289,512	342,557	(a)
Other districts.....	10,198,417	9,876,608	8,069,357	Korea.....	153,058	148,987	(a)
Germany.....	13,030,356	9,545,248	5,965,342	Philippine Islands.....	200	170	160
Hungary.....	362,140	253,164	157,109	Total.....	86,700,000	69,700,000	49,600,000
Italy.....	714,841	578,314	544,824	World's Total.....	97,200,000	79,400,000	55,300,000

(a) Information not available.

(b) Including pig iron produced at government and other steel works for conversion into steel.

(c) Figures of *American Iron and Steel Institute*.

Table 138.—World Production of Steel Ingots and Castings, 1929-1931

(Supplied by *Imperial Institute*)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom.....	9,536,200	7,325,700	5,202,600	Italy.....	2,088,677	1,715,817	1,503,115
Union of South Africa (b)...	38,269	38,956	42,663	Norway.....	3,800	3,122	1,802
Canada.....	1,378,024	1,011,743	672,109	Luxemburg.....	2,659,579	2,234,060	2,002,814
India.....	575,310	618,922	625,148	Poland.....	1,354,970	1,218,000	1,020,641
Australia (c).....	348,000	420,000	150,000	Russia (years ended Sept.			
Total.....	12,000,000	9,400,000	6,700,000	30).....	4,801,000	5,706,600	5,330,000
FOREIGN COUNTRIES				Spain.....	987,611	909,932	635,174
Austria.....	621,952	461,000	317,266	Sweden.....	682,959	601,177	530,719
Belgium.....	4,044,596	3,301,196	3,073,372	Mexico.....	110,777	111,929	72,352
Czechoslovakia.....	2,158,759	1,788,509	1,490,159	United States.....	56,433,473	40,699,483	25,945,501
France:—				Japan.....	2,306,058	2,289,483	1,834,660
Saar.....	2,174,022	1,904,237	1,514,050	China (estimated).....	30,000	30,000	30,000
Other districts.....	9,545,765	9,297,366	7,698,095	Brazil.....	17,690	20,366	(a)
Germany.....	15,769,785	11,191,422	8,160,301	Total.....	106,300,000	83,800,000	61,500,000
Hungary.....	505,362	363,554	311,297	World's Total.....	118,300,000	93,200,000	68,200,000

(a) Information not available.

(b) Including rails, fishplates, etc.

(c) Figures of *American Iron and Steel Institute*.

MAGNESIUM

In the manufacture of metallic magnesium, especially selected calcined magnesite was formerly employed by one American company, but now the metal is made from magnesium chloride, both in the United States and other countries. There is no production of this metal in Canada.

The average price of magnesium metal in 1915 was approximately five dollars per pound, it can now be purchased in carload lots at thirty cents. Magnesium alloys are about one-third lighter than those of aluminium and possess only 25 per cent of the weight of iron or steel. The alloys are strong and lend themselves to many means of working. They can be extruded, welded, drawn, rolled, cast or forged as other metals with which industry is familiar. At the new price, magnesium by volume becomes directly competitive with aluminium. It is being used in ever increasing quantities in the motor, aircraft, radio and other industries.

Magnesium Development Company, an organization to develop and utilize magnesium was formed in 1931 by the Aluminum Company of America and the German I. G. Farbenindustrie. The I. G. Company has extensive interests in the German Aluminum Werke and controls Elektron-Metall, manufacturer of Electron, a series of high magnesium alloys.

MANGANESE

During 1931, 117 tons of manganese ore valued at \$2,893 were produced in Canada as compared with 273 tons worth \$1,356 in 1930. The 1931 output consisted of high grade concentrates from the Dean, Chapter and Cain properties at New Ross, Nova Scotia, and crude ore from Turtle Creek in New Brunswick. Shipments from the Nova Scotia deposits contained from 87 per cent to 96 per cent MnO_2 , and were consigned to Cologne, Germany, for experimental purposes; the output from the New Brunswick mine was shipped to an electro-metallurgical plant in Ontario. Manganiferous raw materials shipped in the United States in 1930 were as follows:—manganese ore (35 per cent or more manganese) 53,326 long tons; ferruginous manganese ore (10 to 35 per cent of manganese) 77,417 long tons; manganiferous iron ore (5 to 10 per cent of manganese) 707,973 long tons; manganiferous zinc residuum, 113,060 long tons; battery ore (chemical manganese ore) 11,757 long tons, and miscellaneous manganese ore, 1,952 long tons.

The importance of manganese in the manufacture of iron and steel is steadily increasing; a large part of the consumption is in the manufacture of manganese-iron alloys (spiegeleisen and ferromanganese) for the making of special steels.

Chief sources of manganese and the largest known deposits are in Russia (Caucasus), Southern and Central India and East Central Brazil. It also occurs in commercial quantities in several countries of Europe, and in Canada, the United States, Cuba, Mexico and Australia.

The State of Minas Geraes, Brazil, possesses the largest manganese deposits in the Americas. Ores consist of manganite, pyrolusite and psilomelane, the grade exported contains from 48 to 50 per cent manganese. Ore is found in two series of rocks, one consists of limestone and quartzite and the other an eruptive of Laurentian age. In 1925 ore was mined and delivered to the docks at Rio de Janeiro at a cost not below \$4.59 per ton.

Table 139.—Production of Manganese Ore in Canada, 1921-1931

Year	Tons	Value
1921.....	68	\$ 3,400
1922.....	73	2,044
1923.....	200	1,400
1924.....	584	4,088
1925-29.....		
1930.....	273	1,356
1931.....	117	2,893

Note.—For years 1886 to 1920 see previous reports.

Table 140.—World Production of Manganese Ore, 1929-1931

(Supplied by Imperial Institute)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Gold Coast (exports).....	419,224	417,490	247,191	Spain.....	17,590	16,553	17,633
Northern Rhodesia.....	1,849	873	1,467	Sweden.....	14,378	8,542	8,232
Union of South Africa.....	9,202	144,994	100,290	Egypt.....	188,453	119,297	100,174
Canada (bog ore).....		244	104	Morocco (French zone).....	12,942	15,900	11,320
India.....	994,279	829,946	537,844	Tunis.....	1,358	(a)	(a)
Unfederated Malay States..	32,183	20,696	8,946	Cuba (exports).....	8,400	(a)	(a)
Australia.....	313	125	13	Porto Rico (exports).....	2,316	2,536	2,374
Total.....	1,460,000	1,410,000	900,000	Mexico.....	(a)	296	719
FOREIGN COUNTRIES				United States (c).....	60,379	67,035	39,242
Austria (b).....	38,437	25,176	11,298	Argentina.....	205	236	218
Czechoslovakia.....	95,004	83,874	82,558	Brazil.....	288,685	159,478	142,731
France.....	2,560	1,381	(a)	Chile.....	3,055	6,040	877
Germany.....	467	2,312		China.....	62,200	70,700	24,000
Greece.....	1,600	645	301	Japan.....	18,100	(a)	2,871
Hungary.....	18,743	8,946	1,114	Netherlands, East Indies..	20,665	17,361	(a)
Italy.....	9,760	10,465	6,320	Turkey.....	148	900	1,000
Jugoslavia.....	4,424	1,515	2,414	Total.....	2,100,000	2,200,000	(a)
Roumania.....	34,485	32,998	18,490	World's Total.....	3,600,000	3,600,000	(a)
Portugal.....			265				
Russia (years ended Sept. 30)							
Nikopol.....	602,264						
Tchiaturi.....	634,125	1,543,362	(a)				
Urals.....	550						

(a) Information not available.

(b) Manganese content of manganese ore and manganiferous iron ore.

(c) Shipments, excluding ore containing 10-35 per cent Mn. which is included with iron ore.

MERCURY

No production of new mercury was recorded in Canada for 1931. Previous to 1897 a comparatively small output of quicksilver was recorded as having been produced in British Columbia from a property situated on the north shore of Kamloops lake. Cinnabar also occurs at Tyaughton creek in the Bridge river area, British Columbia; exploratory work on deposits in this area has revealed some quite high grade exposures of cinnabar-bearing rock. Early in 1931 a furnace was constructed on the beach of Barkley Sound, British Columbia, to treat cinnabar ore from the dump of the Canadian Quicksilver Company. The trail to the mine was also improved but no production was reported.

Cinnabar, the most important ore of mercury, is found in many places throughout the world but the chief producing countries are Italy, Spain and the United States in order of their importance.

Recent uses for mercury include its employment in the construction of neon lights and its adoption in the making of artificial silks. It is also utilized in the manufacture of automatic switches for electrical devices, radio tubes, explosives, storage batteries and as a fertilizer for grass. The mercury boiler is another potential consumer; mercury heated in one boiler is used first like steam to drive a turbine and then exhausted for recovery by condensation. Considerable quantities of the metal are used for the amalgamation of gold in auriferous quartz ores.

Table 141.—Production of Mercury in Canada, 1895-1931

Year	Flasks	Price per flask	Value
1895.....	71	\$ 33.00	\$ 2,348
1896.....	58	33.44	1,940
1897.....	9	36.00	324
1898-1931.....			

Table 142.—Imports into Canada of Mercury, 1925-1931

Year	Pounds	Value
1925.....	146,435	\$ 118,697
1926.....	100,492	84,910
1927.....	124,099	160,330
1928.....	199,603	269,746
1929.....	346,701	478,048
1930.....	105,755	153,837
1931.....	21,159	25,454

Table 143.—World Production of Mercury, 1929-1931

(Supplied by Imperial Institute)

(Pounds)

Country	1929	1930	1931
BRITISH EMPIRE			
New Zealand.....		4,040	34,200
FOREIGN COUNTRIES			
Austria.....	10,041	6,217	998
Czechoslovakia.....	144,282	156,570	168,927
Italy.....	4,405,431	4,261,281	2,861,600
Russia (years ended Sept. 30).....	286,600	250,000	(a)
Spain.....	5,457,752	1,460,803	1,503,843
Algeria.....	9,259	24,700	82
Mexico.....	182,181	366,499	554,183
United States.....	1,799,800	1,638,000	1,895,972
Chile.....		152	(a)
Turkey.....	17,925	40,875	17,925
Japan.....	3,185	9,208	7,725
China.....	45,000	56,000	49,000
Korea.....	718	1,946	(a)
World's Total	12,400,000	8,303,003	7,300,000

(a) Information not available.

MOLYBDENUM

Molybdenite (MoS_2) deposits are known to occur in Nova Scotia, Quebec, Ontario, Manitoba and British Columbia. Production of molybdenite in Canada since the close of the World War has been rather erratic. The Moss mine at Quyon, Quebec, was one of the more important producers of molybdenite concentrates; this property, however, is now idle. The only producer in 1931 was the Phoenix Molybdenite Corporation; this company shipped 1,222 pounds of concentrates valued at \$280 to Hamburg, Germany. The ore was mined in Bagot township, Renfrew county, Ontario, and milled by the Mines Branch, Department of Mines, Ottawa. Molybdenum is used extensively in aircraft and automobile steels. A substantial outlet has recently been developed in the nickel-molybdenum-iron alloys, containing as much as 20 per cent molybdenum, which are capable of resisting the action of hydrochloric acid. Results of tests conducted by the United States War Department are reported in a paper by Capt. S. B. Ritchie who states that (a) molybdenum can be substituted in whole or in part for tungsten in high speed tools and (b) there are no difficulties of manufacture of molybdenum high-speed tools in quantities that can not be easily met. Imports of calcium molybdate when imported into Canada by manufacturers of steel for use exclusively in the manufacture of steel in their own factories amounted to 34,326 pounds valued at \$11,481 in 1931; no imports of this material were recorded for 1930.

Table 144.—Production of Molybdenite in Canada, 1920-1931

Year	Ores mined	Ores treated	Ores and concentrates shipped		MoS ₂ content of shipments	MoS ₂ production (probable recovery)	
	Tons	Tons	Tons	Value (a) \$	Pounds	Pounds	Value (b) \$
1920-1923.....							
1924.....	700	668	10.0	9,370	18,739	18,739	9,307
1925.....	3,000	2,779	15.3	11,176	22,350	22,350	11,176
1926.....	4,186	4,490	12.6	10,472	20,943	20,943	10,472
1927.....							
1928.....							
1929.....	9,100	2,900	9.5	6,400	16,150	16,150	6,400
1930.....							
1931.....	12	12	0.61	280	1,222	1,222	280

(a) Value as given by the operators. (b) Estimated at the average market value of molybdenite.

NOTE.—For years 1902 to 1919 see previous reports.

Table 145.—World Production of Molybdenum Ore, 1929-1931

(Supplied by *Imperial Institute*)

(In cwt—112 pounds of concentrates)

Country	1929	1930	1931
BRITISH EMPIRE			
Canada (MoS_2).....	144		11
Australia.....	10	105	11
FOREIGN COUNTRIES			
Austria.....	77	5	
Norway (MoS_2).....	3,478	4,193	4,390
French Morocco (ore).....	18	200	(a)
United States (sales) (Mo content).....	59,830	55,402	46,616
Korea.....	582	520	(a)
China.....	160	100	(a)
Mexico.....			112

(a) Information not available.

RADIUM-URANIUM

No Canadian radium ores were sold in 1931; in Ontario the Ontario Radium Corporation Ltd. carried on exploratory and development work at the Ontario radium mine in Cardiff township, Haliburton county. Some of the ore from this deposit consisting of uraninite in a gangue of fluorite, calcite, apatite, magnetite, hornblende, biotite, mica and feldspar was recently treated by the Mines Branch Ore Dressing Division at Ottawa. At Echo Bay, Great Bear Lake, in the Northwest Territories, the Eldorado Gold Mines Limited conducted extensive surface operations on the important pitchblende-silver veins recently located by that company. Shipments of these ores consisting of high-grade native silver and radium-bearing minerals were made to the Mines Branch in Ottawa, where research work is being conducted as to the economic recovery of their commercially valuable mineral constituents or elements. Imports of radium into Canada during 1931 amounted to \$207,735 in value as compared with \$46,012 in 1930. Prices quoted in the United States, December, 1931, for radium were: per mg. radium content \$50 in lots of 4 grams or more to \$65 for 1 gram; smaller quantities, \$70. The Union Minière du Haut Katanga is the largest producer of radium ores in the world. Ore mined by this company in the Belgian Congo is treated at Oolen, Belgium, for recovery of radium. It is reported that the radium produced from these ores was 20 grams, 26 grams, 42 grams, 60 grams, 60 grams, in the years 1926 to 1930 respectively. Exports of uranium ore from the Belgian Congo in 1931 were 382 metric tons.

Electrolytic methods have now been extended to include the preparation of the rare metals thorium and uranium in the research laboratories of the Westinghouse Lamp Company. Either uranium or thorium metal may be cold rolled, hammered or drawn to almost any extent and are now commercially available in the form of wire or sheet. Both uranium and thorium are radioactive and tend to ionize the gas surrounding them, this property is taken advantage of in constructing electrodes for gas discharge devices where a low initial breakdown voltage is desired.

Table 146.—Production of Uranium Minerals, 1929-1931

(Supplied by *Imperial Institute*)

(Cwt. 112 pounds)

Country	1929	1930	1931
Czechoslovakia (U ₃ O ₈).....	316	259	309
Germany (Prussia).....	14		
Madagascar.....			8
United States (U ₃ O ₈).....	232	(a)	11
Belgian Congo.....	(b)	(b)	8,149

Uranium minerals were produced in the United Kingdom during 1928 and 1929, but figures are not available for publication.

Uranium minerals are also produced in Russia. The production as recorded in 1927 was about 50 tons; later information is not available.

(a) Information not available.

(b) The output of uranium minerals is not available for these years but it is reported that the radium produced from these ores amounted to 60, 60 and 40 grams in 1929, 1930 and 1931 respectively. This production of radium represents the greater part of the world's supply.

SELENIUM AND TELLURIUM

Selenium is the most recent addition to the numerous refined metal products now being produced in Canada. It is obtained as a by-product in copper refining and was produced for the first time in Canada early in 1931 at the plant of the Ontario Refining Company Limited at Copper Cliff, Ontario. It is generally sold either in the form of amorphous powder or as small rods and buttons. The Canadian production of 21,500 pounds in 1931 was valued at \$40,850. Selenium was quoted in the United States during December 1931 at \$1.80 to \$2.00 per pound, depending on quantity, for black, powdered, 99.5 per cent pure.

The unique property of selenium is that the electrical resistance is lowered upon exposure to light. This particular property has caused the development of the selenium cell. Other industrial uses of selenium are the flame proofing of switchboard tables; as a vulcanizing and accelerating agent in rubber manufacturing, as a colourizer and colour neutralizer in glass and pottery industries and as Ferro-Selenium in the manufacture of alloy steels especially those high in chromium.

Metallic tellurium is used as a crystal detector in radio work, as a colouring agent in certain glass and ceramic ware, as an anti-knock compound for gasoline and in photography. The commercial use of tellurium revealed a large increase in 1930, this increase was largely the result of large scale experiments with tellurium as a rubber compounding material. The principal source of selenium and tellurium is the anode slime produced in the electrolytic copper refineries.

TANTALUM

The interest in the commercial application of tantalum continues to increase. The minerals tantalite and columbite occur in Renfrew county, Ontario, where in 1931 some 10,000 acres were reported to have been acquired by American interests with a view to developing the deposits. Tantalum is considered a rare metal. Western and north Australia have, during recent years, been the principal sources of tantalite. Throughout 1931 tantalum ore was quoted at 70 cents per pound of Ta_2O_5 contained and C.P. tantalum bar and heavy sheet at \$91 per kilo.

The metal's great resistance to corrosion encourages its employment as a coating. It is also used as a backing for the precious metals. Rapid progress has been made recently in the employment of tantalum carbide as a cutting tool. It is reported that for some purposes it is superior to tungsten carbide.

TIN

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The occurrence of tin ore has been reported from several localities, the most important perhaps being the discovery of cassiterite, near New Ross, Lunenburg county, N.S. Reports on this occurrence may be found in the Summary Reports of the Geological Survey Branch of the Department of Mines for 1907, 1908, 1910, 1911 and 1912.

Cassiterite occurs in a few scattered crystals in pegmatite dykes in the drainage basin of McDougal creek, Lardeau division, B.C., and it has been found also in black sands in the Atlin district, B.C., and in the alluvial sands of Dublin gulch, Mayo district, Yukon.

Tin is also found in Sullivan mine ore which is primarily lead and zinc. It has been separated by the Consolidated Mining and Smelting Company, Limited, but up to the present, the work has been only experimental and there has been no commercial production of the metal from this source.

Tin bearing pegmatites of the Winnipeg river area, in Manitoba, received considerable attention during 1929; an appreciable amount of exploratory work was accomplished on the more promising of these occurrences.

The principal tin consuming industries are food packing and automobile manufacturing. Tin-bearing alloys, tinplate clippings, and melting pot drosses are the most important materials from which secondary tin is reclaimed. Most of the tin recovered from alloys does not pass through a refined tin stage but is made into alloys which are brought to the required specifications by the addition of virgin metals. A very important development in the tin situation was the formation of an international Tin Pool in 1931, this pool will work in close co-operation with the International tin committee; the tin to be acquired by the pool will be released in accordance with a sliding scale of prices accepted by the four governments which signed the international Tin Quota Agreement. The agreement expires in February, 1933.

Table 147.—Imports into Canada of Tin, 1929-1931

	1929		1930		1931	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Tin in blocks, pigs and bars.....	5,714,500	2,670,819	5,273,700	1,757,494	4,125,800	1,067,395
Tin foil.....	102,152	55,092	74,470	35,633	27,167	12,095
Strip waste.....					304,000	1,615
Collapsible tubes.....		49,841		61,464		62,889
Tin plated kitchen and dairy hollow-ware, not painted or decorated.....		81,238		104,010		65,552
Manufactures of tin plate, painted, japanned, decorated or not, and manufactures of tin, n.o.p.....		870,961		936,242		983,897
Tin cans and containers for food.....		644,075		555,907		80,493
Bichloride of tin or tin crystals.....	965,236	282,329	785,875	181,704	945,832	177,166
Total.....		4,651,355		3,632,451		2,451,102

Table 148.—World Smelter Production of Tin, 1929-1931

(Supplied by Imperial Institute)
(Long tons)

Country	1929	1930	1931
BRITISH EMPIRE			
United Kingdom (estimated).....	55,400	47,300	35,600
British Malaya (b).....	105,514	96,972	87,514
Australia.....	2,260	1,544	1,690
Total.....	163,000	146,000	125,000
FOREIGN COUNTRIES			
Belgium (estimated).....	900	700	200
France.....	507	700	700
Germany.....	2,671	2,805	3,689
Italy.....	118	87	8
Netherlands (estimated).....	1,000	2,000	3,000
Portugal.....			61
China (exports).....	6,532	6,256	5,891
French Indo-China.....	309	283	67
Japan.....	665	773	999
Netherlands East Indies (exports).....	13,350	14,359	12,783
Norway.....	(a)	(a)	196
Mexico.....			12
Total.....	26,000	28,000	27,000
World's Total.....	189,000	174,000	152,000

(a) Information not available.

(b) Exports plus or minus difference between "carry over" at end and beginning of the year.

TITANIUM

The minerals rutile and ilmenite constitute the chief ores of titanium, deposits of rutile are mined in Norway and Virginia, U.S.A. Ilmenite, containing rutile, occurs in large deposits north of Baie St. Paul, Quebec. Shipments of titaniferous iron ore have been exported from the district for some years. The 1931 production amounted to 1,509 tons valued at \$10,261. Titanium in the form of ferrotitanium is employed as a scavenger in steels and cast iron.

Not until 1920 were titanium dioxide pigments marketed on a commercial scale; by 1929 the United States consumption was in the neighbourhood of 6,000,000 pounds, according to the United States Bureau of Mines; titanium dioxide is whiter than most of the other pigments and has a remarkably high covering power and being practically inert does not react with ordinary solvents. Titanium pigments also find growing use in the manufacture of linoleum, coated textiles, rubber, wall papers, printing inks, glass, and enamel ware. The use of titanium in pigments is by far the leading tonnage outlet for titanium ores. A new and interesting use for titanium is reported to have been found in arc welding. The use of ferrotitanium in the electrodes in place of silicon or manganese has been found to be more suitable in bringing about deoxidation of the weld.

TUNGSTEN

Tungsten is found in widely separated districts in the Dominion. Minerals containing this metal occur in the provinces of Nova Scotia, New Brunswick, Manitoba and British Columbia, also in the Yukon Territory. The deposits in Nova Scotia and New Brunswick appear to possess the greatest economic possibilities; comparatively small shipments of tungsten ores were made in 1912 and 1917, since then no production has been recorded. In 1931 the Indian Path Mines Limited conducted some development work at the Indian Path mine in Lunenburg county, Nova Scotia. Experiments were made on this ore in the Technical College, Halifax; the company reports that a small concentrating plant is being arranged for and that production is planned for 1932. China, during recent years, has been the greatest producer of tungsten ores, the production from that country amounting to over half of the world's output of tungsten ores. Bolivia, India, United States and Portugal are, next to China, the principal tungsten producing countries of the world. Tungsten is employed in the manufacture of alloy steels, electric light filaments, tools and many other metal products. Imports of metallic elements and tungstic acid in 1931 for use only in the manufacture of metal filaments for electric lamps amounted in value to \$88,054 as compared with a value of \$75,601 in 1930. New York prices for tungsten ore at the close of 1931 were: per unit WO_3 , Chinese wolframite, \$10.75 to \$11 duty paid. Bolivian scheelite, \$10 90; domestic, \$10.50 to \$11.50.

Table 149.—World Production of Tungsten Ore and Concentrates, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom—				Russia (years ended Sept.			
Tungsten ore.....	27	128	100	30)—			
Content (WO_3).....	16	90	71	Wolfram.....			
Southern Rhodesia—				Scheelite.....			
Tungsten ore.....	26	35	21	Spain—			
Union of South Africa—				Wolfram.....	251	231	129
Mixed ores (W content)...			1	Content (WO_3).....	151	150	(a)
India—				Mexico—			
Tungsten ore.....	1,348	2,452	2,248	Tungsten ore.....	10	25	
Federated Malay States—				United States—			
Wolfram.....	44	65		Concentrates (60% WO_3)	741	627	1,254
Scheelite.....	280	784	368	Argentina—			
Unfederated Malay				Tungsten ore.....	58	90	19
States—				Bolivia—			
Wolfram.....	116	195	193	Tungsten concentrates			
Australia—				(exports) (W content)...	962	524	242
Wolfram.....	211	201	80	China—			
Scheelite.....	9	6	4	Tungsten ore (exports)...	9,708	6,736	2,970
New Zealand—				French Indo-China—			
Tungsten ore.....	23	24		Tin-Tungsten ores (WO_3)			
FOREIGN COUNTRIES				content.....	117	130	156
Czechoslovakia—				Japan—			
Tin-tungsten ore (WO_3				Tungsten ore.....	55	73	5
content.....	44	44	10	Korea—			
France—				Tungsten ores (60% WO_3)	14	11	(a)
Tin-tungsten ore (WO_3				Netherlands East Indies—			
content).....	10		(a)	Tungsten ore.....	10	15	(a)
Portugal—				Siam (exports)—			
Wolfram.....	344	464	257	Tungsten ore.....	56	6	10
Tin-tungsten ores.....	6		(a)				

(a) Information not available.

VANADIUM

Vanadium production, during recent years, was practically restricted to the ores from Minasragra, Peru; the oxidized metallic minerals from Broken Hill, Northern Rhodesia and from the vicinity of Otaru, South West Africa; and the Roscoelite and related minerals of Western Colorado and Southeastern Utah. At the end of 1930 Broken Hill Development Co. (Ltd.), which has descloisite and vanadinite in connection with a large zinc deposit in Northern Rhodesia, had its plant for the production of ferrovanadium in operation, this plant was in continuous operation throughout 1931. The annual capacity is said to be 570 tons of ferrovanadium containing 34 per cent vanadium.

In Canada vanadium occurs in association with magnetite in deposits in Ontario located in the eastern part of the province and the Rainy River district.

Vanadium is used for the making of tough steels and the United States Bureau of Mines state that its use would undoubtedly increase much faster if the price could be lowered. The metal is also employed in the chemical industries, especially as a catalyst in the production of sulphur trioxide.

Table 150.—World Production of Vanadium Ores, 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	1929	1930	1931
BRITISH EMPIRE			
Northern Rhodesia (metal).....	59	55	151
Concentrates.....			703
South West Africa.....	3,036	4,461	4,602
FOREIGN COUNTRIES			
Mexico (V_2O_5 content).....	1		
Peru (V content).....	888	440	
France.....	50	70	(a)

(a) Information not available for publication.

Vanadium ores are also produced in the United States.

CHAPTER SIX

THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

An increase in the production of Canadian ores containing the non-ferrous metals has stimulated an expansion in the domestic smelting and refining of these metals. Abundant water power, conveniently located in regard to the mining districts, has made possible the generation of electric energy at such low cost that the utilization of electrochemical or electrothermic processes has been adopted for many metallurgical purposes. Some of the more important of these applications include the electrolysis of alumina and the production of aluminium in various forms in Quebec, the production of electrolytic copper at Montreal East; the refining of nickel and copper in central Ontario and the manufacture of refined zinc in Manitoba and British Columbia. Electrolytic lead is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company. Electric furnaces are also used throughout the world in the production of abrasives, ferro-alloys, titanium products, magnesium, beryllium, iron, ferro-silicon, carbides and cyanamide.

As a source of power, electric energy is being used to an ever increasing extent in mining and milling operations where important economies in operation are being effected.

In the extraction and treatment of ores, the mining and milling are so closely associated that it is impossible to make a separation of the statistics of these two operations. There is less difficulty in drawing a line between mining and milling on the one hand, and smelting and refining on the other, though there are cases where mining, milling and smelting operations are so closely related that it is not feasible to separate the figures on capital employed. In cases such as these the figures on capital employed have been included with the smelting industry. This chapter is devoted to a consideration of the smelting and refining industry in Canada as it applies to the ores of the non-ferrous metals.

The 14 plants operated by 11 companies in this group in 1931 were as follows: 1 plant at Arvida and 1 plant at Shawinigan Falls, Quebec, both operated by the Aluminum Company of Canada, Ltd.; the smelter at Rouyn, Quebec, operated by the Noranda Mines, Ltd.; the new copper refinery of Canadian Copper Refiners, Ltd., Montreal East; the nickel smelters at Coniston, and Copper Cliff and the refinery at Port Colborne, Ontario, operated by the International Nickel Company of Canada, Ltd., the Falconbridge Nickel Mines smelter at Falconbridge, a new electrolytic copper refinery at Copper Cliff, owned by the Ontario Refining Company; the smelter and hydrometallurgical works of the Deloro Smelting and Refining Company at Deloro, Ontario; the smelter of the Kingdon Mining, Smelting and Manufacturing Company, Ltd., near Galletta, Ontario; a zinc refinery and copper smelter operated by the Hudson Bay Mining and Smelting Co., Ltd., at Flin Flon, Manitoba; the smelter, lead and zinc refineries, precious metals refinery and copper refinery of the Consolidated Mining and Smelting Company at Tadanac, near Trail, B.C.; and the smelter of the Granby Consolidated Mining, Smelting and Power Company, Ltd., at Anyox, B.C.

In the province of Quebec the Aluminum Company of Canada operated both the Arvida and Shawinigan Falls reduction plants continuously. Aluminium pig is produced in both reduction works while aluminium ingots and fabricated products constitute the output of the fabricating plant at Shawinigan Falls. During 1931 the smelter of Noranda Mines, Ltd., treated 765,544 tons of ore, concentrate, siliceous fluxing ore and slag, and produced 4,672,714 pounds of blister copper and 58,584,560 pounds of anodes, making a total of 63,257,274 pounds of copper bullion, the average analysis of which was 99.37 per cent copper, 17.67 ounces of silver, and 8.01 ounces of gold per ton; since March 19, 1931, all copper was shipped in the form of anodes, weighing approximately 700 pounds each, to Canadian Copper Refiners, Ltd., Montreal East. Owing to conditions prevailing in the copper market throughout the year under review, the amount of copper produced by the company was reduced but the output of gold more than doubled.

The new Montreal East refinery of Canadian Copper Refiners Ltd., a subsidiary of Noranda, operated satisfactorily during 1931. Blister copper from the Noranda smelter in Rouyn, Quebec, and the Flin Flon smelter of the Hudson Bay Mining and Smelting Company in

Manitoba is refined in this plant. Copper scrap is also treated by the company. Copper ingots from this refinery are used in the adjacent mill of the Canada Wire and Cable Co., Ltd.; this is an allied corporation whose products include round rods, drawn copper for shaped or round trolley wire, large and small drawn copper wire either plain or tinned, medium or soft, also stranded wires and cables and all ranges of weatherproof wires and cables.

At Galetta, in Ontario, the Kingdon Mining and Smelting Company suspended mining and smelting operations in August. Pig lead was produced at this plant for several years.

The International Nickel Company of Canada, Ltd., reports that the Copper Cliff concentrator and smelter treated 1,347,722 tons of copper-nickel ore and produced 72,747 tons of bessemer matte and 22,013 tons of blister copper. The new roasters in the plant are exceeding estimated capacity and it was evident that the change from blast furnace practice to reverberatory smelting is effecting even greater economies than were anticipated; the Orford process plant at Copper Cliff was completed, and this new plant embodies many improvements over the former installation at Port Colborne. Operations at the Coniston, Ontario, smelter of the same company were greatly curtailed, only two of its four blast furnaces running from January to September and one blast furnace and the sintering plant for the balance of the year. During 1931 this smelter treated 427,717 tons of copper-nickel ore and produced 23,163 tons of bessemer matte. There was a considerable reduction in the operations at the Port Colborne, Ontario, nickel refinery and during the latter months of the year only two of the nine electrolytic nickel circuits were working; the copper converters were closed down in August and the cupolas in November preparatory to transferring the Orford separation process to the new plant at Copper Cliff. Production of nickel at this plant, excluding sulphide for the Clydach refinery in Wales, totalled 31,877,840 pounds as compared with 61,704,271 pounds in 1930; there were also produced 28,688 tons of blister copper as compared with 59,503 tons in the previous year. Export sales of nickel from the Port Colborne refinery to the United States were off 33 per cent and to other countries, 21 per cent from the figures of 1930; sales of nickel by the Mond Nickel Company, Ltd., from Clydach decreased 16 per cent from the previous year. Copper sales, inclusive of copper in sulphate produced in Wales, decreased from 109,743,747 pounds to 96,919,677 pounds or 12 per cent.

The Ontario Refining Company, Ltd., an associate company of the International Nickel Company operated their refinery at Copper Cliff at approximately fifty per cent capacity. This plant electrolytically treated blister copper produced by the Granby Consolidated Mining and Smelting Company at Anyox, British Columbia; blister copper produced by the International Nickel Company and blister copper made by the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba, from ores mined at the Sherritt Gordon mine. The plant also treats precious metal bearing slags, concentrates, bullion, etc. Copper products consist of wire bars, ingot bars, small ingots, V.C. cakes, cathodes, slabs and billets. Selenium was recovered in 1931, for the first time in Canada, at this refinery.

At Deloro, Ontario, the Deloro Smelting and Refining Company operated their metallurgical plants throughout the year and produced silver bullion, white arsenic, cobalt oxide, cobalt metal, nickel oxide, mixed oxides, and a silver-lead-bismuth bullion; this last named product is exported.

In Manitoba the Hudson Bay Mining and Smelting Company operated the Flin Flon copper smelter continuously in 1931. There were no breakdowns and several improvements were made which greatly increased the efficiency of the plant. There was smelted new charge to the reverberatory furnace during the year 175,437 tons of ore and concentrates assaying gold, 0.433 ounces; silver, 4.30 ounces; copper, 10.04 per cent. Blister shipped contained 73,000 ounces of gold, 709,149 ounces of silver and 31,232,114 pounds of copper. In addition, 32,659 tons of custom ore and concentrates were smelted on toll. The cyanide annex which recovers gold, silver and accessory copper from the tailings discharged from the flotation section of the mill treating the heavy sulphide ore, treated 432,539 tons and recovered in the form of zinc dust precipitate 8,261 ounces gold, 76,355 ounces silver, and 39,601 pounds of copper. The electrolytic zinc plant operated steadily and efficiently during the year. This department treated 63,828 tons of zinc concentrates from which were produced 35,056,199 pounds of 99.9865 per cent pure zinc. Stocks of zinc plant residues totalled 35,171 tons; these assayed gold, .201 ounces; silver, 4.37 ounces; zinc, 23.1 per cent, and copper, 2.13 per cent. Cadmium precipitate stored amounted to 2,166 tons and averaged 50.9 per cent zinc, 2.49 per cent cadmium, and 7.78 per cent copper. It is intended to treat the cadmium precipitate during 1932.

The greatest advance in 1931 in the Trail smelting plants of Consolidated Mining and Smelting Company in British Columbia was undoubtedly in the lead smelting plant. This was attained through the operation of the slag fuming department and the changes made possible in the blast furnace practice. The furnace speed in 1929 was 270 tons of charge against 336 tons in 1931 for the standard furnaces and 504 tons for the new large furnace. The fuming plant has produced and can continue to produce 23 per cent more zinc and 4 per cent more lead from the same ore than was formerly possible, or in other words, has added 23 per cent to the Sullivan zinc ore reserves and 4 per cent to the reserves of Sullivan lead ores. The lead production was 138,772 tons as against 151,370 tons in 1930. The zinc plant maintained production costs at the 1930 level notwithstanding a ten per cent drop in production; new low record costs were attained in both the lead and silver refineries. These costs were 4 per cent below those of 1930, the previous low record year. Operations in the cadmium plant were intermittent, production amounting to 161 tons; untreated cadmium residues were stocked awaiting a more favourable market. The copper smelter was inactive throughout the year.

During 1931 the Granby Consolidated Mining, Smelting and Power Company continuously operated the Anyox smelter in the Nass river mining division of British Columbia. Production was subjected to necessary curtailment to meet adverse copper market conditions. In 1931 the company produced 35,235,910 pounds of copper from 1,577,700 tons of ore mined at the Hidden Creek and Bonanza mines. Remarkably creditable results have been achieved by the management and staff and the per pound production cost of copper was persistently lowered during the period under review.

Table 151.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment.....	121,869,072	129,485,934
(Estimated value if rented.)		
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	29,419,783	20,927,287
†(c) Inventory value of finished products on hand.....		8,492,748
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	23,721,831	16,763,226
Total.....	175,010,686	175,669,195

†Included with item (b) in 1930.

Table 152.—Employees, Salaries and Wages in the Non-Ferrous Smelting and Refining Industry in Canada, 1930 and 1931

	1930	1931
Salaried employees.....	No. 788	878
Salaries.....	\$ 2,009,895	2,131,079
Wage earners*.....	No. 7,838	6,982
Wages.....	\$ 11,786,229	11,114,248
Total Employees.....	No. 8,626	7,860
Total Salaries and Wages.....	\$ 13,796,124	13,245,327

*See note on page 35.

Table 153.—Ores, Concentrates and Residues Smelted and Value of Smelter and Refinery Products in the Non-Ferrous Smelting and Refining Industry, 1930 and 1931

	1930	1931
	\$	\$
Materials used—		
Ores, concentrates, residues, etc. (estimated value).....	45,310,472	48,336,301
Products sold—		
Gold, silver, platinum metals, blister copper, refined copper, lead, zinc, nickel, nickel-copper matte, nickel oxide, nickel salts, cobalt, cobalt oxide, speiss residues, aluminium, base bullion, cadmium and bismuth.....	100,946,136	98,565,755

CHAPTER SEVEN

THE COAL MINING, COKE, NATURAL GAS, PEAT AND PETROLEUM INDUSTRIES
(Fuels) IN CANADA

The Coal Mining Industry in Canada

1. General Review
2. Commodity Statistics on Coal—including Tables on Output, Disposition, Shipments, Imports into Canada and Exports, Consumption and World Output

The Coke and Gas Industry in Canada

The Peat Industry in Canada

The Petroleum Industry in Canada

1. Production of Crude Petroleum
2. Production of Petroleum Products

NOTE.—In order to correlate data, regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information in detail regarding these industries as a whole, dealing principally with the mineral industry although supplementary data are shown for closely allied manufacturing operations.

THE COAL MINING INDUSTRY

Canadian mines produced 12,243,211 tons of coal valued at \$41,207,682 in 1931, a decline of 17.7 per cent in quantity and 22 per cent in value from the 1930 output of 14,881,324 tons worth \$52,849,748. The 1931 production included 8,861,360 tons of bituminous coal, 471,343 tons of sub-bituminous coal and 2,910,508 tons of lignite coal. Nova Scotia's output declined 20.7 per cent, New Brunswick's 13 per cent, Alberta's 20.7 per cent, and British Columbia's 10 per cent. Saskatchewan's output increased 14.4 per cent and the Yukon's 38.4 per cent.

Mines in operation during the year produced only 60 per cent of their possible output as compared with 70 per cent in 1930. The output loss in 1931 was computed at 8,193,947 tons; 95.2 per cent of which was due to lack of orders. An estimated additional loss of 52,210 tons was caused through nine labour disputes involving 2,129 men with a consequent loss in working time of 11,523 man-days. Nova Scotia mines in operation during the year produced 58 per cent of their possible output; New Brunswick mines, 63 per cent; Saskatchewan mines, 65 per cent; Alberta mines, 58 per cent, and British Columbia mines, 67 per cent.

Interprovincial shipments of coal provide important outlets for Canadian coal. In 1931, Nova Scotia shipped 408,843 tons of coal to New Brunswick, 76,483 tons to Prince Edward Island, 1,746,085 tons to Quebec, and 52 tons to Ontario. New Brunswick mines made a small shipment to Quebec. Saskatchewan lignite shipments included 244,408 tons to Manitoba, 1,524 tons to Ontario, 71 tons to British Columbia, and 33 tons to Alberta. Mines in Alberta supplied the Saskatchewan market with 903,801 tons, Manitoba with 443,107 tons, British Columbia with 171,835 tons, Ontario with 26,750 tons and Quebec with 100 tons. British Columbia shipped 66,725 tons to Saskatchewan, 57,562 tons to Manitoba, 34,247 tons to Alberta, and 72 tons to Ontario.

Sales of Canadian coal for railroad use in 1931 totalled 3,146,967 tons, or 28.7 per cent of the total mine shipments; in 1930, railroads absorbed 30.37 per cent or 4,085,228 tons of the coal shipped from Canadian mines.

Exports of coal from Canada have declined sharply since 1927. In that year, 1,113,330 tons were exported from Canada; in 1928, a decline to 863,941 tons was recorded and in 1930 the exports were still lower at 624,512 tons. During 1931, exportations amounted to 359,853 tons or only 32.3 per cent of the 1927 total.

Coal imports into Canada decreased 23·2 per cent to 13,531,831 tons in 1931 as compared with the 1930 importations of 17,620,074 tons. Receipts of coal from the United States totalled 12,467,815 tons, consisting of 2,236,423 tons of anthracite, 10,224,982 tons of bituminous and 6,410 tons of lignite. Imports from Great Britain were recorded at 998,662 tons, made up of 876,364 tons of anthracite and 122,298 tons of bituminous. Despite the fact that imports of Great Britain coal were 12·6 per cent below the 1930 total, British coal supplied 27·6 per cent of the Canadian anthracite requirements in 1931 as against 23·4 per cent in the preceding year. Canada's coal supply was further supplemented by 60,762 tons from Germany, and 4,592 tons from French Indo-China.

Employment was furnished to 27,860 employees by Canadian coal mines in 1931 as compared with the 1930 average of 29,172. In Eastern Canada 14,528 persons were employed and in the western mines 13,332 employees were engaged during the year. Surface employees averaged 223 days work while underground men worked only 174 days; in 1930 the averages were—surface, 250 days and underground, 210 days. Salaried employees and wage-earners received \$28,802,428 during 1931 as compared with \$36,442,361 in the preceding year and \$42,376,378 in 1929.

The decline in employment in the coal mining industry is clearly shown in the number of man-days work done during the year, namely, 4,891,541 as against 6,076,684 in 1930 and 7,117,692 in 1929. The daily earning power per man was computed at \$5.28 in 1931; in 1930 the average was \$5.47 and in 1929 it was \$5.49.

Table 154.—Capital Employed in the Coal Mines of Canada by Provinces as at December 15, 1930 and 1931

Province	1930				1931			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	46,449,139	3,727,540	5,906,656	56,083,335	47,499,461	2,495,702	5,772,916	55,768,079
New Brunswick....	1,390,495	24,900	227,008	1,642,403	1,635,844	19,934	246,197	1,901,975
Saskatchewan.....	4,113,672	120,979	123,199	4,357,850	4,318,100	115,508	208,142	4,641,750
Alberta.....	45,452,048	1,070,620	7,444,514	53,967,182	41,137,728	1,360,120	6,421,881	48,919,729
British Columbia..	21,420,210	581,531	2,060,884	24,062,625	21,549,427	663,836	2,065,070	24,278,333
Yukon.....	203,000			203,000	203,000			203,000
Canada.....	119,028,564	5,525,570	15,762,261	140,316,395	116,343,560	4,655,100	14,714,296	135,712,866

Table 155.—Employees, Salaries and Wages in the Coal Mines in Canada, by Provinces, 1931

Province	Average number of employees					Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Surface	Under-ground				
						\$	\$	\$
Nova Scotia.....	447	61	2,278	11,110	13,896	1,004,541	13,414,542	14,419,083
New Brunswick.....	20	4	148	460	632	52,890	451,686	504,576
Manitoba.....			12	26	38		3,000	3,000
Saskatchewan.....	45	8	166	372	591	105,200	404,432	509,632
Alberta.....	528	41	2,089	5,935	8,593	1,258,645	7,376,358	8,635,003
British Columbia.....	202	15	1,094	2,796	4,107	539,270	4,190,880	4,730,159
Yukon.....			1	2	3		984	984
Canada.....	1,242	129	5,788	29,701	27,860	2,960,546	25,841,882	28,802,428

Table 156.—Wage-earners Employed in the Coal Mines of Canada, by Classes and by Provinces, 1931, with Comparative Totals for 1930

Classification	Province							Canada		
	Nova Scotia	New Brunswick	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Surface	Under-ground	Total
Administration.....	75	15		13	89	18		187	23	210
Foremen and clerks.....	144	16	4	21	214	99		485	13	498
Screenmen and loaders.....	709	37		46	688	137	1	1,618		1,618
Stripping shovel.....				6				6		6
Officials.....	550	5	3	14	341	136		10	1,039	1,049
Hand cutters and helpers.....	1,156	386	23	206	1,867	1,275	2		4,915	4,915
Machine cutters.....	1,317	4		16	363	75			1,775	1,775
Machine loaders and helpers.....	1,998	13		49	1,683	121			3,864	3,864
Horse haulage employees.....	632	2	5	41	510	275		43	1,422	1,465
Mechanical haulage employees.....	1,686	9		16	340	289		83	2,257	2,340
Ventilation employees.....	268				79	31		2	376	378
Roadmakers.....	290	7		18	150	60		8	517	525
Timbermen.....	1,074	19		5	244	175		19	1,498	1,517
Pumpmen.....	114	3		7	41	22		6	181	187
Loading shovel.....				4				4		4
Chute loaders.....					135				135	135
Enginemen.....	189	13	3	10	155	69		427	12	439
Firemen.....	137	3		12	103	45		300		300
Machinists.....	205	2		4	70	56		325	12	337
Carpenters and masons.....	119	1		6	48	59		232	1	233
Other mechanics.....	313	1		5	90	104		280	233	513
Japanese.....						59		1	58	59
Chinese.....						222		136	86	222
Indians.....										
All other employees.....	2,412	72		39	814	563		1,616	2,284	3,900
Total for 1931.....	13,388	608	38	538	8,024	3,890	3	5,788	20,701	26,489
Total for 1930.....	13,376	584		529	8,849	4,363	3	6,106	21,598	27,704

Table 157.—Output of Coal from Canadian Mines, 1922-1931

Year	Short tons	Value	Average per ton
		\$	\$
1922.....	15,157,431	65,518,497	4.32
1923.....	16,990,571	72,058,986	4.24
1924.....	13,638,197	53,593,988	3.93
1925.....	13,134,968	49,261,951	3.75
1926.....	16,478,131	59,875,094	3.63
1927.....	17,426,861	61,867,463	3.55
1928.....	17,564,293	63,757,833	3.66
1929.....	17,496,557	63,065,170	3.60
1930.....	14,881,324	52,849,748	3.55
1931.....	12,243,211	41,207,682	3.37

Table 158.—Output and Value of Coal in Canada by Kinds and by Provinces, 1930 and 1931

(Short tons)

Province	1930			1931		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
			\$			\$
NOVA SCOTIA (Bituminous).....	36	6,252,552	24,528,860	38	4,955,563	19,016,720
NEW BRUNSWICK (Bituminous).....	15	209,349	864,118	18	182,181	743,196
MANITOBA (Lignite).....				3	1,306	3,797
SASKATCHEWAN (Lignite).....	57	579,424	968,863	*58	662,836	945,259
ALBERTA—						
Bituminous.....	17	2,278,467	7,971,401	17	1,846,306	6,249,779
Sub-bituminous.....	22	603,358	1,705,236	23	471,343	1,211,197
Lignite.....	254	2,873,703	8,386,588	†268	2,246,366	5,881,699
Total.....	293	5,755,528	18,063,225	308	4,564,015	13,342,675
BRITISH COLUMBIA (Bituminous).....	28	2,083,818	8,421,572	26	1,876,406	7,150,996
YUKON (Bituminous).....	1	653	3,110	1	904	5,039
CANADA—						
Bituminous.....	97	10,824,839	41,789,061	100	8,861,360	33,165,730
Sub-bituminous.....	22	603,358	1,705,236	23	471,343	1,211,197
Lignite.....	311	3,453,127	9,355,451	329	2,910,508	6,830,755
Total.....	430	14,881,324	52,849,748	452	12,243,211	41,207,682

* Exclusive of 15 small mines in operation towards the close of the year.

† Exclusive of 18 small mines operated by farmers under special permits.

Table 159.—Disposition of Coal from Canadian Mines, 1930 and 1931

	1930			1931		
	Total coal	Total value	Average value per ton	Total coal	Total value	Average value per ton
		\$	\$		\$	\$
Supplied to employees for domestic consumption.....	189,684	670,882	3.54	168,265	601,146	3.57
Used for power purposes—						
(a) Shops.....	103,269	350,910	3.40	84,702	282,867	3.34
(b) Colliery boilers.....	704,437	2,043,076	2.90	614,860	1,667,103	2.71
(c) Companies' railroads.....	72,807	275,296	3.78	63,448	235,270	3.71
(d) Harbour tugs and dredges.....				201	850	4.23
Shipped. (See Table 161)—						
(a) Ships' bunkers.....	333,687			222,526		
(b) Railroads.....	4,085,228	48,730,804	3.62	3,146,967	37,762,927	3.44
(c) Other.....	9,032,933			7,603,342		
Used in making coke at colliery.....	109,955	390,338	3.55	110,219	391,283	3.55
Used in making briquettes.....	45,183	113,303	2.51	28,102	70,437	2.51
Put on bank.....	774,297	2,948,723	3.81	726,068	2,647,031	3.65
Put on waste heap.....	221,530			200,463		
Total disposition.....	15,673,010	55,523,332	3.54	12,969,163	43,658,911	3.37
Lifted from bank.....	791,686	2,673,584	3.38	725,952	2,451,232	3.38
Total output.....	14,881,324	52,849,748	3.55	12,243,211	41,207,682	3.37

Table 160.—Disposition of Coal from Canadian Mines by Provinces, 1931
(Short tons)

	Nova Scotia	New Brunswick	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Canada
Supplied to employees for domestic consumption.....	111,614	2,589	107	2,467	32,688	18,794	6	168,265
Coal shipped. (See Table 161)...	4,459,911	173,094	1,106	605,837	4,233,408	1,499,219	260	10,972,835
Used under colliery boilers, etc...	263,736	5,228		28,042	195,026	122,810	18	611,869
Used by companies' railroads....	41,161	900		3,286	6,679	11,422		63,448
Used for manufacture of coke at colliery.....						110,219		110,219
Used in making briquettes.....				13,979	14,123			28,102
Used in shops, etc.....	84,702							84,792
Used by harbour tugs and dredges	201							201
Put on bank.....	609,843	8,649		7,610	31,514	68,167	285	726,068
Put on waste heap.....	19,809	56	93	2,716	89,455	87,999	335	209,463
Total disposition.....	5,599,977	199,516	1,306	663,937	4,692,893	1,918,630	904	12,969,163
Lifted from bank.....	635,414	8,335		1,101	38,878	42,224		725,952
Total output.....	4,955,563	182,181	1,306	662,836	4,561,015	1,876,406	904	12,243,211

Table 161.—Shipments of Coal from Canadian Mines by Grades and Destinations, 1930 and 1931

(Short tons)

Destination	1930				1931			
	Run-of-mine	Screened	Slack	Total	Run-of-mine	Screened	Slack	Total
Prince Edward Island.....	3,398	82,313	2,193	87,904	3,339	69,859	3,285	76,483
Nova Scotia.....	214,339	572,208	738,516	1,525,063	241,637	444,489	441,524	1,127,650
New Brunswick.....	167,344	141,067	195,737	504,148	127,859	114,656	223,946	466,461
Quebec.....	53,634	964,711	875,749	1,894,094	67,558	805,092	873,633	1,743,283
Ontario.....	845	26,022	4,845	31,712	395	22,229	5,774	28,398
Manitoba.....	167,621	366,714	241,531	775,866	163,932	282,891	299,360	746,183
Saskatchewan.....	205,247	893,078	440,544	1,538,869	222,975	647,457	429,488	1,299,920
Alberta.....	256,352	463,005	508,441	1,227,798	202,137	377,294	443,193	1,022,624
British Columbia.....	40,213	710,160	249,036	999,409	28,780	574,299	234,588	837,667
Yukon.....		293		293		260		260
Total domestic shipments.....	1,108,993	4,219,571	3,256,592	8,585,156	1,058,612	3,338,526	2,954,791	7,351,929
Railroads.....	3,021,284	750,493	313,451	4,085,228	2,367,457	591,709	187,801	3,146,967
Ships' bunkers.....	250,311	82,481	895	333,687	169,590	55,432	504	225,526
Total railroads and ships' bunkers.....	3,271,595	832,974	314,346	4,418,915	2,534,047	647,141	188,305	3,369,493
United States.....	10,647	74,234	64,869	149,750	1,418	40,484	82,528	124,430
Alaska.....		26,456		26,456		18,022		18,022
Newfoundland.....	2,080	204,120	57,637	263,837	1,889	106,700		108,589
St. Pierre.....						372		372
Lost at sea.....		4,318	3,416	7,734				
Total external shipments.....	12,727	309,128	125,922	447,777	3,307	165,578	82,528	251,413
Total.....	4,393,315	5,361,673	3,695,860	13,451,848	3,595,966	4,151,245	3,235,624	10,972,835

Table 162.—Imports of Anthracite and Bituminous Coal into Canada from Great Britain, by Grades and by Provinces, 1930 and 1931

(Short tons)

Destination	1930			1931		
	Anthracite		Bituminous all grades	Anthracite		Bituminous all grades
	Egg, nut, etc.	Dust		Egg, nut, etc.	Dust	
Prince Edward Island.....		1,496	1,676	7,413		1,833
Nova Scotia.....	29,859		19,557	34,844		38,352
New Brunswick.....	60,844		35	45,598		6,162
Quebec.....	863,972	39,956	124,931	781,605	4,696	75,560
Ontario.....				2,208		391
Canada.....	954,675	41,452	145,199	871,668	4,696	122,298

Table 163.—Imports of Anthracite, Bituminous and Lignite Coal into Canada from the United States by Grades and by Provinces, 1930 and 1931

(Short tons)

Destination	1930				1931			
	Anthracite		Bituminous, all grades	Lignite	Anthracite		Bituminous, all grades	Lignite
	Egg, nut, etc.	Dust			Egg, nut, etc.	Dust		
Prince Edward Island.....	5,274	2,759	4,408		1,271		3,246	
Nova Scotia.....	30,086		18,018		15,209	95	5,685	
New Brunswick.....	26,827	1,498	72,299		38,644	776	31,068	
Quebec.....	599,520	155,377	1,111,811		434,863	110,100	858,015	
Ontario.....	1,978,818	147,104	11,955,589		1,483,553	148,184	9,315,172	
Manitoba.....	4,764	3,559	24,898		2,415	1,280	7,041	
Saskatchewan.....	367		1,816	736			1,535	23
Alberta.....			1,351				912	
British Columbia.....		1	8,879	17,940		33	2,298	6,387
Yukon.....			7				10	
Canada.....	2,645,656	310,298	13,199,076	18,676	1,975,955	260,468	10,224,982	6,410

Table 164.—Imports of Anthracite and Bituminous Coal into Canada from Other Countries, by Provinces, 1930 and 1931

(Short tons)

Destination	Source	1930			1931		
		Anthracite		Bitu- minous, all grades	Anthracite		Bitu- minous, all grades
		Egg, nut, etc.	Dust		Egg, nut, etc.	Dust	
Nova Scotia.....	Russia.....	14,340					
	French East Indies.....				4,592		
New Brunswick.....	Russia.....	24,880					
Quebec.....	Germany.....	11,480			60,762		
	Russia.....	252,187					
	Newfoundland.....			33			
British Columbia.....	French East Indies.....	1,122					
Canada.....		301,009		33	65,354		

Table 165.—Average Imports of Coal into Canada by Kinds and by Provinces for the Five Years, 1927-1931

(Short tons)

Destination	Anthracite			Total bitumin- ous	Lignite	Total all grades
	Egg, nut, etc.	Dust	Total			
Prince Edward Island.....	6,218	1,018	7,236	5,854		13,090
Nova Scotia.....	62,271	19	62,290	37,353		99,643
New Brunswick.....	95,433	1,550	96,983	66,363		163,345
Quebec.....	1,403,370	170,106	1,573,476	1,331,933		2,905,409
Central Ontario.....	1,903,596	145,468	2,049,064	10,550,067		12,599,131
Head of Lakes.....	49,199	1,409	50,608	1,413,281		1,463,889
Total Ontario.....	1,952,795	146,877	2,099,672	11,963,348		14,063,020
Manitoba.....	6,991	2,452	9,443	62,120	379	71,942
Manitoba and Head of Lakes.....	56,190	3,861	60,051	1,475,401	379	1,535,831
Saskatchewan.....	359		359	2,101	172	2,632
Alberta.....				1,255		1,255
British Columbia.....	1,550	11	1,561	14,184	11,609	27,354
Yukon.....				26		26
Canada.....	3,528,987	322,033	3,851,020	13,484,537	12,160	17,347,717

Table 166.—Exports of Canadian Coal by Destinations, 1929-1931

(Compiled in the External Trade Branch)

Destination	1929		1930		1931	
	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$
BRITISH EMPIRE						
United Kingdom.....	26,605	195,958	18,453	132,602	10,488	70,508
Irish Free State.....	683	4,343	1,745	10,531	186	1,163
British South Africa.....	12,089	74,057	6,466	38,796	2,951	17,706
Bermuda.....	950	7,600				
British Guiana.....					1,056	7,920
British Honduras.....			125	738		
British West Indies—						
Jamaica.....						
Other B.W.I.....			396	3,286		
Gibraltar.....	1,335	8,010	5,123	30,737	992	5,949
Malta.....					1,246	6,230
Newfoundland.....	269,168	1,426,701	286,630	1,472,401	112,663	616,101
Sierra Leone.....			3,226	18,956	1,211	7,266
Australia.....	19,225	159,409	26,305	209,504	12,637	104,884
New Zealand.....	6,752	41,834	2,837	17,017	3,477	19,533
Total British Empire.....	336,807	1,917,912	351,306	1,934,568	146,907	857,260
FOREIGN COUNTRIES						
Argentina.....	1,066	6,396	5,193	31,158	7,871	47,229
Belgium.....	3,463	20,406	4,816	32,621	477	2,862
Brazil.....			1,530	9,180	3,947	27,095
China.....	4,994	41,448	565	4,690	423	3,511
Cuba.....	380	3,135	352	2,112	400	2,400
Denmark.....	758	4,548				
France.....	5,108	35,171	2,832	17,815	3,246	18,287
French Possessions—						
French Africa.....			1,209	7,254		
St. Pierre and Miquelon.....	2,248	13,746	2,652	16,021	4,560	27,097
Syria.....	290	1,740				
Germany.....	2,140	12,741	1,640	11,656	536	3,213
Greece.....	1,085	8,097	4,157	25,885	2,472	14,432
Italy.....	3,327	22,981	4,799	29,031	1,589	9,592
Japan.....			3,455	19,250	1,862	11,741
Netherlands.....	5,247	35,510	1,945	11,829	1,592	8,702
Norway.....	421	2,521	2,449	9,799	1,729	7,347
Peru.....			801	5,807	3,309	22,233
Poland and Danzig.....	371	2,489				
San Domingo.....			38	190		
Spain.....	916	5,493	705	5,816		
Sweden.....	552	3,162	470	2,820		
Turkey.....	641	4,352				
United States.....	451,516	2,080,807	210,326	1,003,080	163,351	743,533
Alaska.....	21,642	152,663	23,272	165,413	15,582	103,388
Total foreign countries.....	506,165	2,457,416	273,206	1,411,430	212,946	1,052,662
Total.....	842,972	4,375,328	624,512	3,345,998	359,853	1,909,922

Table 167.—Annual Consumption of Coal in Canada, 1922-1931

Calendar year	Canadian*		Imported coal "entered for consumption"				Total	Per capita
			From U.S.A.	From Great Britain	Total†			
	Short tons	%	Short tons	Short tons	Short tons	%	Short tons	
1922.....	13,044,352	50.2	12,255,555	765,980	12,962,189	49.8	26,006,541	2.916
1923.....	15,070,962	41.8	20,417,239	572,570	20,967,971	58.2	36,038,933	4.000
1924.....	12,529,358	42.8	16,405,344	317,112	16,714,143	57.2	29,243,501	3.199
1925.....	12,125,290	42.6	15,744,957	604,117	16,331,971	57.4	28,457,261	3.062
1926.....	15,086,296	47.7	16,204,405	287,299	16,565,555	52.3	31,651,851	3.349
1927.....	15,944,983	46.7	17,266,434	907,220	18,177,303	53.3	34,122,286	3.541
1928.....	16,487,807	50.0	15,830,688	682,755	16,515,582	50.0	33,003,389	3.356
1929.....	16,387,461	48.0	16,780,452	843,502	17,724,132	52.0	34,111,593	3.402
1930.....	14,052,671	43.3	16,971,933	1,144,861	18,412,039	56.7	32,464,710	3.181
1931.....	11,682,779	47.7	11,793,798	987,442	12,828,327	52.3	24,511,106	2.362

*The sum of Canadian coal mine sales, colliery consumption, coal supplied to employees, and coal used in making coke, etc., less the tonnage of coal exported.

†Includes small tonnages from countries other than Great Britain and the United States. Deductions have been made to take account of foreign coal re-exported from Canada and bituminous coal ex-warehoused for ships' stores.

Table 168.—Summary Statistics for 1931—Output, Exports, Interprovincial Shipments, Imports and Coal made Available for Consumption in Canada, by Provinces

(Short tons)

Province	Canadian coal				Imported from U.S.A.	Imported from Great Britain	Imported from Germany	Imported from French East Indies	Coal available for consumption
	Output	Received from other provinces	Shipped to other provinces	Exported					
PRINCE EDWARD ISLAND—									
Anthracite.....					1,271	7,413			8,684
Bituminous.....		76,483			3,246	1,833			81,562
Total.....		76,483			4,517	9,246			90,246
NOVA SCOTIA—									
Anthracite.....					15,304	34,844		4,592	54,740
Bituminous.....	4,955,563		2,231,463	151,912	5,685	38,352			2,616,225
Total.....	4,955,563		2,231,463	151,912	20,989	73,196		4,592	2,670,965
NEW BRUNSWICK—									
Anthracite.....					39,420	45,598			85,018
Bituminous.....	182,181	408,843	98	54,986	31,068	6,162			573,170
Total.....	182,181	408,843	98	54,986	70,488	51,760			658,188
QUEBEC—									
Anthracite.....					544,963	786,301	60,762		1,392,026
Bituminous.....		1,746,183		57	858,015	75,560			2,679,701
Sub-bituminous.....		67							67
Lignite.....		33							33
Total.....		1,746,283		57	1,402,978	861,861	60,762		4,071,827
CENTRAL ONTARIO—									
Anthracite.....					1,613,435	2,208			1,615,643
Bituminous.....		*455		30	8,619,083	391			8,619,899
Sub-bituminous.....		*5,792							5,792
Lignite.....		*22,151		38					22,113
Total.....		28,398		68	10,232,518	2,599			10,263,447
MANITOBA AND HEAD OF LAKES—									
Anthracite.....					21,997				21,997
Bituminous.....		176,804		92	703,130				879,842
Sub-bituminous.....		48,250							48,250
Lignite.....	1,306	520,023		1,196					520,133
Total.....	1,306	745,077		1,288	725,127				1,470,222
SASKATCHEWAN—									
Anthracite.....									
Bituminous.....		120,467		9	1,535				121,993
Sub-bituminous.....		27,215							27,215
Lignite.....	662,836	822,844	246,036	2,233	23				1,237,434
Total.....	662,836	970,526	246,036	2,242	1,558				1,386,642
ALBERTA—									
Bituminous.....	1,846,306	34,247	214,904	230	912				1,666,331
Sub-bituminous.....	471,343		119,027						552,316
Lignite.....	2,246,366	33	1,211,662	961					1,033,776
Total.....	4,564,015	34,280	1,545,593	1,191	912				3,052,423
BRITISH COLUMBIA—									
Anthracite.....					33				33
Bituminous.....	1,876,406	41,589	158,606	128,986	2,298				1,632,701
Sub-bituminous.....		37,703							37,703
Lignite.....		92,614		19,123	6,387				79,878
Total.....	1,876,406	171,906	158,606	148,109	8,718				1,750,315
YUKON—									
Bituminous.....	904				10				914
Total.....	904				10				914
CANADA—									
Anthracite.....					2,236,423	876,364	60,762	4,592	3,178,141
Bituminous.....	8,861,360	2,605,071	2,605,071	336,302	10,224,982	122,298			18,872,338
Sub-bituminous.....	471,343	119,027	119,027						471,343
Lignite.....	2,910,508	1,457,698	1,457,698	23,551	6,410				2,893,567
Total.....	12,243,211	4,181,796	4,181,796	359,853	12,467,815	998,662	60,762	4,592	25,415,189

* Includes all coal shipped to any point in Ontario from western mines.

Table 169.—World Production of Coal* 1927-1931

(Including brown coal)
(Long tons)

Country	1927	1928	1929	1930	1931
BRITISH EMPIRE					
Great Britain—					
Anthracite.....	6,346,890	5,521,570	6,364,036	6,400,705	5,829,175
Bituminous (a).....	244,885,446	231,950,361	251,542,766	237,481,119	213,629,776
Lignite.....	502	640	322	—	—
Irish Free State—					
Anthracite.....			67,734	†	†
Semi-bituminous.....			17,453	†	†
Nigeria (b).....	357,899	359,316	344,937	347,842	327,681
Southern Rhodesia.....	894,396	1,077,557	1,020,446	923,915	577,983
Union of South Africa.....	12,381,692	12,407,539	12,812,790	12,029,529	10,709,114
Canada—					
Bituminous.....	11,613,389	11,580,241	11,481,084	9,665,035	7,911,929
Sub-bituminous.....	532,281	661,157	597,055	538,712	420,842
Lignite.....	3,414,027	3,432,078	3,542,887	3,083,149	2,598,668
British Borneo—					
State of North Borneo.....	62,701	60,779	58,339	58,491	28,926
Sarawak.....	16,445	17,679	13,610	14,680	18,213
Federated Malay States.....	463,001	556,590	661,514	565,573	402,355
India—					
Gondwana Coalfields.....	21,664,488	22,153,314	23,001,586	23,342,372	21,716,435
Tertiary Coalfields.....	417,848	389,558	417,148	460,676	
Australia—					
Bituminous.....	13,522,960	11,839,780	10,365,319	9,531,359	8,700,000
Lignite.....	1,455,482	1,591,858	1,741,176	1,831,507	1,900,000
New Zealand—					
Bituminous.....	1,290,529	1,348,732	1,367,164	1,382,875	979,636
Brown coal.....	954,436	973,238	1,049,603	1,046,677	1,069,749
Lignite.....	121,775	114,783	119,097	112,540	108,371
Total.....	320,000,000	306,000,000	327,000,000	309,000,000	277,000,000
FOREIGN COUNTRIES					
Austria—					
Bituminous.....	172,828	198,906	204,735	212,478	224,541
Brown coal.....	3,015,675	3,211,042	3,469,123	3,014,605	2,934,978
Belgium—					
Anthracite and semi-anthracite.....	5,899,589	6,035,006	5,826,029	5,710,956	26,608,285
Bituminous.....	21,216,242	21,107,733	20,688,421	21,270,796	
Bulgaria—					
Anthracite.....		1,183	2,479	2,303	†
Bituminous.....	1,218,099	67,255	75,130	67,233	†
Brown coal.....		1,339,298	1,548,121	1,498,345	1,483,320
Czechoslovakia—					
Bituminous.....	13,794,932	14,330,345	16,260,524	14,207,021	12,895,773
Brown coal.....	19,310,756	20,128,419	22,204,480	18,890,532	17,648,430
France—					
Saar.....	13,391,097	12,899,716	13,364,882	13,026,730	11,187,485
Other districts—					
Anthracite and bituminous.....	50,960,760	50,554,526	52,930,400	53,048,640	50,256,326
Lignite.....	1,050,434	1,046,891	1,178,329	1,124,685	1,023,591
Germany—					
Bituminous.....	151,173,466	148,477,965	160,859,314	140,444,006	116,766,357
Lignite.....	148,126,913	162,972,863	171,700,657	143,704,018	131,205,263
Greece—					
Lignite.....	141,082	118,734	154,054	127,576	103,546
Hungary—					
Bituminous.....	773,447	770,908	813,220	798,731	764,150
Brown coal.....	5,983,940	6,240,930	6,659,925	5,746,586	5,650,352
Lignite.....	160,839	164,838	272,765	332,348	364,451
Italy—					
Anthracite.....	16,573	10,321	14,007	19,530	15,331
Bituminous.....	149,293	115,590	205,813	207,946	216,640
Brown coal.....	898,047	686,024	769,694	567,750	358,730
Jugoslavia—					
Bituminous.....	283,184	351,826	435,131	360,430	426,740
Brown coal.....	3,433,470	3,608,130	4,326,603	3,748,858	3,465,459
Lignite.....	954,586	1,012,136	1,036,945	1,077,869	1,022,048
Netherlands—					
Bituminous.....	9,175,868	10,525,314	11,398,293	12,018,229	12,697,631
Brown coal.....	198,201	193,589	154,095	141,873	120,269
Poland—					
Bituminous.....	37,482,601	39,974,905	45,505,803	36,914,000	37,661,000
Brown coal.....	77,225	72,398	73,147	54,000	†
Portugal—					
Anthracite.....		195,705	175,864	183,471	223,475
Bituminous.....	201,127	2,460	18,098	27,345	†
Brown coal.....		26,031	28,880	33,928	†
Roumania—					
Bituminous.....	367,559	391,235	365,088	294,105	282,005
Lignite.....	2,804,999	2,588,144	2,632,831	2,038,348	1,606,088
Russia—					
Anthracite.....					
Bituminous—					
European.....	32,026,639	34,657,125	40,711,700	47,635,600	56,804,500
Asiatic.....					
Brown coal.....					

Table 169.—World Production of Coal* 1927-1931—Concluded

(Including brown coal)

(Long tons)

Country	1927	1928	1929	1930	1931
FOREIGN COUNTRIES— <i>Con.</i>					
Spain—					
Anthracite.....	423,106	383,243	491,851	515,306	516,402
Bituminous.....	6,036,177	5,885,667	6,504,199	6,492,054	6,462,526
Brown coal.....	422,817	415,831	432,018	381,904	336,073
Spitzbergen and Bear Island.....	314,380	280,418	247,218	185,443 (e)	203,086
Sweden.....	392,007	352,851	388,737	391,675	337,777
Algeria.....	20,932	16,368	15,873	16,922	25,188
Belgian Congo.....	86,000	88,000	112,642	131,700	84,359
Madagascar.....			25		
Morocco (French)—					
Anthracite.....				1,000	5,574
Greenland.....	2,900	2,500	3,500	4,700	†
Mexico.....	1,015,020	999,787	1,043,277	1,054,793	770,504
United States—					
Anthracite.....	71,513,896	67,275,062	65,918,031	61,950,747	53,153,000
Bituminous (c).....	462,288,707	447,093,723	477,668,387	417,434,196	337,600,000
Brazil.....	231,294	246,327	167,251	†	†
Chile.....	1,458,113	1,353,890	1,484,051	1,419,367	1,090,100
Colombia.....	†	100,000	100,000	100,000	100,000
Peru.....	159,806	175,675	217,120	196,855	†
Venezuela.....	15,850	15,660	16,593	12,360	†
China (d).....	23,000,000	20,000,000	25,437,000	26,037,000	27,245,000
Dutch East Indies.....	1,594,616	1,676,472	1,802,811	1,840,111	1,320,000
Formosa.....	1,772,005	1,513,000	1,505,860	1,573,478	†
French Indo-China—					
Anthracite.....	1,422,083	1,883,409	1,872,373	1,860,000	1,647,000
Bituminous.....	38,041	39,826	38,277	47,000	30,000
Brown coal.....	7,038	15,228	30,228	28,000	22,000
Japan—					
Semi-anthracite.....	141,181	163,263	33,716,762	30,880,669	27,545,251
Bituminous.....	32,859,856	33,162,143			
Brown coal.....	175,792	119,997			
Karafuto.....	351,407	530,961	625,478	634,788	627,886
Korea—					
Anthracite.....	698,371	457,611	529,744	870,174	†
Bituminous.....		315,322	393,345		
Philippine Islands.....	23,040	27,417	17,047	20,423	18,668
Turkey in Asia—					
Bituminous.....	892,310	1,230,885	1,398,565	1,569,966	1,553,000
Lignite.....		9,105	11,375	8,043	7,651
New Caledonia.....	†	16,000	21,000	10,000	†
Total.....	1,130,000,000	1,130,000,000	1,210,000,000	1,080,000,000	950,000,000
Total.....	1,450,000,000	1,440,000,000	1,540,000,000	1,390,000,000	1,230,000,000

* Data for 1927-1931 obtained from *The Mineral Industry of the British Empire and Foreign Countries*.

† Information not available.

(a) Including a small quantity of anthracite mined in the Fife and Clackmanan districts.

(b) Years ended 31st March of the year following that stated.

(c) Including lignite.

(d) Approximate production.

(e) Exports.

THE COKE AND ARTIFICIAL GAS INDUSTRY

The coke and artificial gas industry in Canada in 1931 included the operation of 41 establishments, with a total capital investment of \$95,872,858. These plants furnished employment to 4,006 employees who received \$5,616,763.

Gas-house, by-product and beehive coke production during 1931 amounted to 1,832,700 tons as against 2,385,994 tons in the preceding year. The seven by-product plants and the one beehive oven plant produced 1,512,381 tons in 1931 and the 24 artificial gas plants made 320,319 tons. In addition, 72,339 tons of petroleum coke were recovered as a by-product in petroleum refining.

The production of artificial gas in 1931 totalled 30,542,961 thousand cubic feet made up of 20,402,799 thousand cubic feet from by-product coke ovens and 10,140,162 thousand cubic feet from gas plants. Gas sales during the year amounted to 17,111,432 thousand cubic feet worth \$13,010,733; most of the remaining gas was used as a fuel in the producing plants or in associated metallurgical works. Petroleum refineries in 1931 produced 5,161,905 thousand cubic feet of still gas for their own use.

Gas-house and by-product coke imported into Canada (entered for consumption) declined 37.1 per cent to 667,832 tons from the 1930 total of 1,061,040 tons. Exports of coke, exclusive of petroleum coke, were recorded at 20,905 tons as compared with 29,801 tons in 1930. Petroleum coke exportations amounted to 16,133 tons.

Table 170.—Materials used in the Coke and Gas Industry in Canada, 1929-1931

Materials	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Bituminous coal:—						
(a) Canadian..... tons	961,391	3,308,849	736,466	2,752,048	564,882	2,346,667
(b) Foreign..... tons	2,696,168	12,676,139	2,454,577	11,565,120	1,967,654	9,349,162
Coke for gas-making—						
(a) Purchased..... tons	7,723	73,080	9,448	95,800	5,238	47,494
(b) Companies' own make..... tons	140,078	1,006,941	144,739	1,085,251	130,272	973,079
Oil (gas oil) for gas-making..... imp. gal.	9,364,684	787,855	12,401,166	992,642	10,935,971	717,474
Calcium carbide..... lb.	82,740	3,398	46,815	2,047	40,000	1,775
Lime..... tons	2,302	21,769	1,942	19,015	1,425	13,475
Water.....		34,222		41,249		32,713
Oxide or purifying materials..... tons	4,959	49,775	5,560	52,254	5,362	50,029
Sulphuric acid, 66°Bé..... lb.	54,314,786	406,462	48,194,821	328,489	29,926,099	227,223
All other materials.....		148,724		148,449		134,970
Total cost.....		18,517,214		17,082,364		13,894,061

Table 171.—Production in Canada, Imports and Exports of Coke and Its By-Products, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Coke—						
PRODUCTION—by provinces—						
Nova Scotia and New Brunswick..... tons	499,080	2,436,683	680,911	4,361,204	538,126	3,837,746
Quebec..... tons	351,372	2,822,763				
Ontario..... tons	1,624,884	11,112,809	1,516,080	10,021,292	1,113,509	7,163,526
Manitoba..... tons	44,597	461,504	189,003	1,469,751	181,065	1,368,460
British Columbia..... tons	157,648	1,113,899				
Total..... tons	2,677,581	17,947,658	2,385,994	15,852,247	1,832,700	12,419,741
IMPORTS..... tons	1,226,853	6,659,514	1,061,040	5,611,597	667,832	3,596,091
EXPORTS..... tons	25,208	189,247	29,801	217,587	20,905	153,415
APPARENT CONSUMPTION..... tons	3,879,226		3,417,233		2,479,627	
Other Products						
*PRODUCTION—						
Ammonium sulphate..... tons	34,140	1,296,952	23,626	926,485	21,869	608,922
Gas: (a) Sales..... M cu.ft.	17,649,371	13,316,684	17,713,477	13,471,629	17,111,432	13,010,733
(b) Used in own plants..... M cu.ft.	7,493,291	1,573,146	6,259,021	1,378,352	4,974,874	1,174,380
(c) Used in associated metallurgical works..... M cu.ft.	12,870,553	1,411,670	11,019,147	1,221,625	7,316,392	881,481
(d) Gas otherwise accounted for, but not sold..... M cu.ft.	178,092	185,595	134,519	136,067	180,928	59,975
(e) Not accounted for..... M cu.ft.	733,779	888,122	801,368	859,639	959,335	1,059,085
Light oils..... imp. gal.	6,058,061	874,012	4,902,023	949,670	3,164,205	576,456
Tar and tar products..... imp. gal.	30,119,476	1,963,746	27,378,400	1,757,902	22,271,880	1,426,537
Ammonia liquor..... pound N H ₃	1,694,538	25,631	2,288,680	33,874	2,266,221	29,058
Pitch..... tons			163	3,018		
All other products.....		4,979		2,351		3,092
IMPORTS—						
Ammonium sulphate..... tons	1,723	80,019	3,423	137,067	12,830	369,254
Coal tar and pitch..... gal.	6,429,566	518,878	4,965,646	343,748		155,861
EXPORTS—						
Ammonium sulphate..... tons	24,489	909,510	12,010	386,710	5,627	167,477
Tar and pitch..... gal.	3,069,247	140,541	4,555,899	182,478	2,880,018	131,129

*Production data include the output of the *Coke and its By-products Industry* and of the *Illuminating and Fuel Gas Industry*.

THE NATURAL GAS INDUSTRY

Natural gas production in Canada during 1931 amounted to 25,874,723 thousand cubic feet valued at \$9,026,754 as compared with 29,376,919 thousand cubic feet worth \$10,289,985 produced in 1930. Alberta was the leading producing province with an output of 17,798,698 thousand cubic feet; Ontario came next with 7,419,534 thousand cubic feet; and New Brunswick followed with 655,891 thousand cubic feet. There was the usual small production from several private wells in Manitoba.

New Brunswick's production of natural gas was obtained from the Stoney Creek field near Moncton. This gas was piped to Moncton and Hillsboro where approximately 6,300 consumers were served.

Three deep-test wells were started in Quebec during 1931 between Montreal and Quebec, south of the St. Lawrence river; one at St. Denis, St. Hyacinthe county, and the other two at St. Gerard and La Visitation, Yamaska county. In addition to these deep-test wells several shallow wells were drilled in Berthier, L'Assomption and Nicolet counties.

Natural gas output in Ontario declined 6.9 per cent in 1931 to 7,419,534 thousand cubic feet as against the 1930 total of 7,965,761 thousand cubic feet. Lessened industrial demand and comparatively mild weather were contributory causes to the falling-off in natural gas consumption. The decrease in industrial demand naturally followed the decline in general business. A reduction in the number of domestic consumers was recorded in certain districts but this was offset by the extension of gas mains into municipalities not served previously. According to the Ontario Natural Gas Commissioner the total open flow of new wells drilled in 1931 was greater than in any other year since 1920. One new field was discovered during the year, at Doyle in the northeastern section of Raleigh township. The Dawn gas field was extended in 1931. Two of the largest gas wells in Ontario are to be found in this field; each of these wells has an open flow of approximately 25,000 thousand cubic feet. The total open flow of the 196 new wells drilled into production during 1931 was 45,123 thousand cubic feet. This represents a continuation of the steady increase shown in 1929 and 1930 as compared with the average annual open flow of 12,000 thousand cubic feet from new wells during the period 1920 to 1928. A feature of the 1931 development was the number of new companies entering the natural gas business on a small scale; these concerns are located principally in the eastern gas field.

At the close of the year 2,258 wells were producing natural gas in Ontario. During the year 52 wells were abandoned, 196 producing wells and 81 dry wells were drilled; the total footage drilled was 248,845.

Alberta's production declined to 17,798,698 thousand cubic feet from the previous year's total of 20,748,583 thousand cubic feet. This decrease was due in the main part to declining industrial demand and to a considerable falling-off in field consumption owing to a curtailment of drilling activities throughout the province.

The Turner Valley field located about 35 miles southwest of Calgary, Alberta, continued to be Canada's principal natural gas producing area. The total gas used from this field in 1931 was 12,242,037 thousand cubic feet. Over 18,000 industrial and domestic consumers in Calgary were served with gas from the Turner Valley field. In addition to the Calgary consumption, considerable quantities of the Turner Valley gas were used in the field for drilling purposes. In 1931, a large quantity of the waste gas from this field was piped into the exhausted sands of the Bow Island field for storage.

Provincial government records show that in the Turner Valley field in December 136,000 cubic feet of natural gas were required to produce a barrel of crude naphtha. The production of natural gas during the month averaged 381,676 thousand cubic feet per day, of which quantity 40,210 thousand cubic feet were used and the remainder was wasted.

In Medicine Hat, 2,285,564 thousand cubic feet of natural gas were consumed in 1931. Approximately 2,500 industrial and domestic consumers were supplied with gas from the 30 wells in this field. Eight wells in the Redcliff field, 2 miles west of Medicine Hat, supplied gas to industrial and domestic consumers.

Edmonton is supplied with natural gas from the Viking field located about 80 miles south-east of the city. Over 10,000 consumers in Edmonton used this gas in 1931. In addition, approximately 600 users outside of Edmonton were supplied with gas from the Viking field.

The 300 consumers in Wainwright obtained their natural gas supply from the Maple Leaf well. Local wells supplied Bow Island, Suffield and Wetaskiwin with gas in 1931. Lethbridge and some smaller centres were furnished with gas from the Canadian Western Natural Gas Company's pipe line.

Imports of mixed gas (natural and artificial) into Canada from the United States amounted to 109,168 thousand cubic feet worth \$74,904; in the previous year 151,671 thousand cubic feet valued at \$96,763 were imported.

Capital employed by the 145 firms operating in this industry in Canada amounted to \$71,085,678. Employment was furnished 1,692 salaried employees and wage-earners who received \$2,072,022 during the year. Expenditures for fuel and electricity totalled \$26,921.

Table 172.—Production of Natural Gas in Canada, by Provinces, 1922-1931

(For the years 1892 to 1921 see Mineral Production of Canada, 1928)

Year	New Brunswick		Ontario		Manitoba		Alberta		Canada	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		\$		\$		\$		\$		\$
1922.....	753,898	148,040	8,060,114	4,076,296	200	60	5,868,439	1,622,105	14,682,651	5,846,501
1923.....	640,300	126,068	8,128,413	4,066,244	200	60	7,191,670	1,692,246	15,969,583	5,884,618
1924.....	599,972	113,577	7,150,078	3,798,381	200	60	7,131,086	1,796,618	14,881,336	5,708,636
1925.....	639,235	122,394	7,143,962	3,958,006	200	60	9,119,500	2,752,545	16,902,897	6,833,005
1926.....	648,316	128,300	7,764,996	4,409,593	200	60	10,794,697	3,019,221	19,208,209	7,557,174
1927.....	630,755	124,637	7,311,215	4,331,780	200	60	13,434,621	3,586,533	21,376,791	8,043,010
1928.....	660,981	324,344	7,632,800	4,535,312	200	60	14,288,605	3,754,466	22,582,586	8,614,182
1929.....	678,456	333,002	8,586,475	4,959,695	600	180	19,112,931	4,684,247	28,378,462	9,977,124
1930.....	661,975	325,751	7,965,761	5,034,828	600	180	20,748,583	4,929,226	29,376,919	10,289,985
1931.....	655,891	323,184	7,419,534	4,635,497	600	180	17,798,698	4,067,893	25,874,723	9,026,754

Table 173.—Number of Gas Wells in Canada, by Provinces, 1929, 1930 and 1931

		New Brunswick	Ontario	Manitoba	Alberta	Canada
Productive wells at beginning of year.....	1929	28	1,922	3	84	2,037
	1930	30	2,120	6	90	2,246
	1931	28	2,108	6	85	2,227
Number of productive wells drilled.....	1929	2	118		8	128
	1930	1	158		2	161
	1931		196		6	202
Number of dry wells drilled.....	1929		76			76
	1930		72		4	76
	1931	1	81		1	83
Number of wells abandoned.....	1929		42		2	44
	1930		54		4	58
	1931		52			52
Productive wells at end of year.....	1929	30	2,120	6	90	2,246
	1930	28	2,108	6	85	2,227
	1931	28	2,266	6	87	2,387

Table 174.—Natural Gas Wells in Ontario, by Townships, 1930 and 1931

Township	1930				1931			
	No. of producing wells in operation Dec. 31, 1930	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1931	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Amabel.....	2				2			
Ancaster.....								
Bayham.....	39	1			37	1		
Bertie.....	89	2		8	91	3	4	6
Binbrook.....	42	1			51			9
Brantford.....								
Caledon E.....								
Caistor.....	39	2	2	15	54	2	2	10
Canboro.....	100	3		1	110	3		15
Caradoc.....							1	
Cayuga, North.....	102	11	14	19	119	4	9	14
Cayuga, South.....	55	2			51			
Charlotteville.....	12	1			11			
Colchester, N.....								
Crowland.....	47	1		1	39			
Dawn.....	17		5	4	18		5	1
Dorchester, N.....					3			
Dover, East.....	2		3	1	9			
Dover, West.....	6							
Dunn.....	31	1	1	1	30			
Ekfrid.....							2	
Enniskillen.....	2				1			
Euphemia.....							1	
Gainsboro.....	6				4	1		
Glanford.....	11				11			
Gosfield.....	17				15			1
Harwich.....							1	
Houghton.....	3				4		2	4
Howard.....								
Humberstone.....	74	1			64	10		
Mersea.....	2				3			
Middleton.....	25	1		1	30		2	10
Malahide.....	1	1			1			
Mosa.....	1		4	1			2	2
Moulton.....	80	7			89	5	6	23
Oneida.....	23	3	3	3	38		5	15
Onondaga.....	23			1	36	1	6	13
Rainham.....	134	2	4	20	160	4	4	19
Raleigh.....	29		7	11	50	1	4	4
Romney.....	143		1	3	143	3		1
Sarnia.....	14							
Seneca.....	163	2	11	17	168	5	3	11
Sherbrooke.....	10	1	2	2	11		2	3
Tilbury, East.....	137	3		2	139			3
Townsend.....							3	
Tuscarora.....	44		2	28	61		7	21
Wainfleet.....	36	4			32	2		
Walpole.....	106		13	17	137	3	8	6
Walsingham, N.....	12				9			
Walsingham, S.....	5	1			11			
Windham.....					5			
Willoughby.....	38			1	39			
Woodhouse.....	15	3			31	1	2	5
Private wells.....	300				300			
Surface wells.....	71				69	2		
Total.....	2,108	54	72	158	2,266	52	81	196

Table 175.—Capital Employed in the Natural Gas Industry in Canada by Provinces, 1930 and 1931

	1930			1931			
	Ontario	Alberta	Canada	Quebec	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—							
Cost of lands, buildings, plant, machinery and tools.....	34,946,348	25,104,285	60,050,633	404,426	35,912,284	24,946,234	61,262,944
Cost of supplies and stocks on hand.....	586,457	236,011	822,468		572,026	192,341	761,367
Cash, trading and operating accounts and bills receivable.....	6,275,149	1,619,880	7,895,029	52,267	5,782,950	1,471,840	7,307,057
Total.....	41,807,954	26,960,176	*70,548,353	456,693	42,267,260	26,610,415	*71,085,678

*Includes data for New Brunswick.

Table 176.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage- earners	Total	Salaries	Wages	Total
	Male	Female					
1930					\$	\$	\$
New Brunswick.....	12	7	55	74	31,776	59,859	91,635
Ontario.....	416	103	838	1,357	756,570	798,649	1,555,219
Alberta.....	85	27	398	510	186,542	516,307	702,849
Canada.....	513	137	1,291	1,941	974,888	1,374,815	2,349,703
1931							
New Brunswick.....	12	7	42	61	31,769	43,811	75,580
Quebec.....	9	3	38	50	17,700	32,466	50,166
Ontario.....	368	103	772	1,243	698,811	684,806	1,383,617
Alberta.....	71	23	244	338	167,129	395,530	562,659
Canada.....	460	136	1,096	1,692	915,409	1,156,613	2,072,022

* See footnote on page 35.

THE PEAT INDUSTRY

Canada produced 1,674 tons of peat valued at \$7,033 in 1931 as compared with 2,847 tons at \$10,932 in the preceding year.

The 1931 shipments of peat were made from St. Hyacinthe, P.Q., and Alfred, Ontario. The peat bog at St. Hyacinthe was not operated in 1931 as stocks on hand were sufficient to meet the local demand.

Table 177.—Production of Peat in Canada, 1922-1931

Year	Tons	Value
		\$
1922.....	3,000	14,500
1923-24.....		
1925.....	1,370	8,394
1926-27.....		
1928.....	1,497	5,845
1929.....	2,607	13,339
1930.....	2,847	10,932
1931.....	1,674	7,033

THE PETROLEUM INDUSTRY IN CANADA

Including (1) Production of Crude Petroleum; and (2) Petroleum Products.

1. Production of Crude Petroleum

In 1931, Canadian wells produced 1,542,573 barrels of crude petroleum, a new high record for the industry. This output consisted of 1,413,631 barrels from Alberta, 122,365 barrels from Ontario and 6,577 barrels from New Brunswick. The Alberta production included 1,334,039 barrels of crude naphtha and light crude oil from the Turner Valley field, 64,200 barrels of light crude oil from the Red Coulee field, and 15,392 barrels of heavy crude oil from the Wainwright-Ribstone field. The provincial government records show 40,064 barrels of naphtha in field storage on December 31, 1931, in addition to which 1,191 barrels of light crude oil were on hand. One hundred and nine oil wells were in operation in Alberta at the close of 1931 and drilling was in progress on 14 other wells in the Turner Valley, Keho Lake, Lethbridge, Milk River, Paint-earth and Waite Valley fields. During the year 80,225 feet were drilled as compared with 190,125 feet in 1930. An additional 817 feet of structure-test drilling was done in 1931; during

the preceding year 35,472 feet were drilled. Nineteen new wells were brought into production in 1931. Firms operating in Alberta in 1931 reported the use of 171,722 feet of casing weighing 3,292 tons as against 425,853 feet with a total weight of 8,309 tons used in the previous year. The 1931 casing was valued at \$369,734 and the 1930 casing at \$1,007,223.

Early in January, the Spooner No. 4 well in the Turner Valley field was brought into production. About the middle of February, the Scottish United well in the Red Coulee field was drilled into production. The Vanalta No. 4 well in the same field came into production early in April. Towards the middle of May, the East Crest No. 3 and the Mayland No. 6 wells in the Turner Valley field were drilled into production; during the same period reports from the southern part of this field showed that the Merland well had come in with a large flow of wet gas. In September, the Southern Lowery No. 3 well in the Turner Valley field was brought into production. During October the Hylø well in the same field shipped a considerable quantity of crude oil to the refineries, although drilling operations were being continued. Towards the close of December, the Sterling Pacific No. 2 wet gas well was drilled into production.

On August 24th, oil refineries in Calgary, Alberta, announced increased prices for naphtha and crude oil. The following extract from a Calgary oil journal shows that these increases were substantial:—

	New price	Old price
Clear naphtha.....	\$ 3.12	\$ 2.74
Discolored naphtha.....	\$ 2.88	\$ 2.50
Crude oil, 50° higher.....	\$ 2.65	\$ 2.36
Crude oil, 45°-49°.....	\$ 2.08	\$ 1.87

Ontario's production advanced 4.3 per cent in 1931 to 122,365 barrels as compared with the 1930 total of 117,302 barrels. This increase was due principally to more efficient operation and to better weather conditions. Ontario oil prices were the lowest in fifteen years.

New Brunswick's output was obtained from wells in the Stoney Creek field. In Saskatchewan, drilling operations were continued in the Simpson field. At the close of the year drilling was still in progress on a well in the Manitou field, Manitoba.

Companies operating and drilling oil wells in Canada during 1931 reported total capital employed at \$57,620,950. Employment was furnished by this industry to 1,209 salaried employees and wage-earners, who received \$1,634,517. The cost of fuel and electricity consumed during the year was \$303,511.

Table 178.—Production of Crude Petroleum in Canada by Provinces, 1922-1931

(For the years 1881 to 1921 see Mineral Production of Canada 1928.)

(Barrel=35 Imp. gal.)

Year	New Brunswick		Ontario		Alberta		Canada	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$		\$
1922.....	7,778	32,732	164,731	526,316	6,559	52,128	179,068	611,176
1923.....	8,826	35,642	159,400	478,149	1,943	8,227	170,169	522,018
1924.....	5,561	21,313	154,368	441,952	844	4,135	160,773	467,400
1925.....	5,376	18,756	143,134	386,555	183,491	845,394	332,001	1,259,705
1926.....	10,544	29,940	137,850	379,221	216,050	902,504	364,444	1,311,665
1927.....	18,244	41,748	139,606	288,347	318,741	1,185,948	476,591	1,516,043
1928.....	8,043	21,391	134,094	249,737	482,047	1,764,172	624,184	2,035,300
1929.....	7,499	19,909	121,194	253,678	988,675	3,458,177	1,117,368	3,731,764
1930.....	6,758	17,378	117,302	235,746	1,398,160	4,780,696	1,522,220	5,033,820
1931.....	6,577	15,461	122,365	219,993	1,413,631	3,976,220	1,542,573	4,211,674

Table 179.—Production of Crude Petroleum in Canada by Provinces, 1930 and 1931

Provinces	1930		1931	
	Barrels	Total value	Barrels	Total value
		\$		\$
NEW BRUNSWICK.....	6,758	17,378	6,577	15,461
ONTARIO—				
Petrolia and Enniskillen.....	55,126	109,741	57,515	101,946
Oil Springs.....	29,160	60,038	30,792	57,628
Moore Township.....	1,691	3,366	3,739	6,621
Sarnia Township.....	1,036	2,063	1,466	2,600
Plympton Township.....	296	589	295	523
Bothwell.....	21,177	42,115	18,024	31,933
West Dover.....	457	909	891	1,581
Onondaga.....	231	762	34	129
Moza Township.....	7,166	14,252	8,517	15,092
Thamesville.....	447	889	463	822
Tilbury East.....	149	296		
Dutton.....	366	726	508	902
Euphemia.....			121	216
Total for Ontario.....	117,302	235,746	122,365	219,993
ALBERTA—				
Turner Valley.....	1,340,428	4,695,762	1,334,039	3,899,504
Wainwright-Ribstone.....	57,732	84,934	15,392	9,838
Red Coulee, Fuego and Skiff.....			64,200	66,878
Total for Alberta.....	1,398,160	4,780,696	1,413,631	3,976,220
Canada.....	1,522,220	5,033,820	1,542,573	4,211,674

Table 180.—Petroleum Wells in Canada, by Provinces, 1929, 1930 and 1931

	New Brunswick	Ontario	Alberta	Canada
Productive wells at beginning of year.....				
1929.....	25	2,643	31	2,699
1930.....	25	2,443	54	2,522
1931.....	26	2,150	89	2,265
Number of productive wells drilled.....				
1929.....		1	24	25
1930.....	1	25	41	67
1931.....		1	19	20
Number of wells abandoned.....				
1929.....		146	8	154
1930.....		53	3	56
1931.....		66		66
Number of dry wells drilled.....				
1929.....		13	7	20
1930.....			12	12
1931.....		8	11	19
Number of productive wells in operation at end of year.....				
1929.....	25	2,443	54	2,522
1930.....	26	2,150	89	2,265
1931.....	26	2,208	109	2,343

Table 181.—Imports into Canada and Exports of Petroleum, Asphalt and their Products, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
IMPORTS—		\$		\$		\$
ASPHALT AND ITS PRODUCTS						
Asphaltum, or asphalt, solid..... tons	53,750	829,328	42,792	650,837	36,901	517,532
Asphalt, not solid.....		99,704		98,458		35,854
Asphaltum oil for paving purposes.....		23,448		70,130		45,557
CRUDE PETROLEUM, FUEL AND GAS OILS						
Crude petroleum in its natural state, .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories..... gals.	1,060,000,971	46,154,347	1,012,029,544	38,241,270	1,017,388,091	22,670,225
Crude petroleum, gas oils other than naphtha, benzine and gasoline lighter than .8235 but not less than .775 specific gravity at 60 degrees..... gals.	182,035	19,599	539,045	58,593	77,280	3,221
Petroleum, crude, not in its natural state, .725 specific gravity or heavier but not heavier than .770 specific gravity at 60 degrees temperature, when imported by oil refiners to be refined in their own factories..... gals.	5,726,147	376,001	8,466,369	600,899	3,296,711	161,228
Petroleum (not including crude petroleum imported to be refined or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature..... gals.	63,264,841	2,444,259	65,733,147	2,406,223	53,550,063	1,760,513
Petroleum, and other oils, imported by miners or mining companies or concerns for use in the concentration of ores of metals in their own concentrating establishments..... gals.	144,890	81,691	134,001	55,242	127,830	59,426
Fuel oil, ex-warehoused for ships' stores..... gals.	32,302,642	868,925	31,560,548	821,313	35,900,828	891,962
KEROSENE AND ILLUMINATING OILS						
Coal oil and kerosene, distilled, purified or refined, n.o.p..... gals.	4,506,255	398,010	4,911,647	360,518	3,493,849	212,420
Illuminating oils, composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon..... gals.	9,486	3,910	10,687	4,660	11,143	7,322
Coal oil and kerosene, distilled, known as "engine distillate", when .725 specific gravity and heavier, but not heavier than .770 specific gravity at 60 degrees temperature..... gals.	17,092	1,714	64,757	9,856	172,588	15,246
LUBRICATING OILS						
Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon..... gals.	7,369,099	1,289,594	8,048,755	1,477,639	9,319,547	1,591,795
Lubricating oils, n.o.p..... gals.	10,035,095	4,155,353	8,261,051	3,540,113	4,481,448	1,983,060
GASOLINE AND OTHER OILS						
Gasoline under .725 specific gravity at 60 degrees temperature..... gals.	135,558,699	15,096,277	93,822,017	9,488,190		
Gasoline .725 specific gravity and heavier, but not heavier than .770 specific gravity at 60 degrees temperature..... gals.	39,551,756	4,702,487	49,953,335	5,712,502	(b) 8,610	821
Natural casinghead compression or absorption gasoline lighter than .6690 specific gravity at 60 degrees temperature, when imported by distillers of petroleum for blending with other gasolines distilled in Canada. (From Sept. 17, 1930).... gals.			9,140,726	784,525	32,140,805	2,152,102
Gasoline, n.o.p..... gals.	41,115	5,322	10,530,470	1,129,284	(b) 11,320,270	1,147,897
Gasoline lighter than .8235 specific gravity at 60 degrees temperature(a)..... gals.					73,243,020	6,372,346
All other oils, n.o.p..... gals.	194,794	137,337	308,019	131,324	578,535	127,343

Table 181.—Imports into Canada and Exports of Petroleum, Asphalt and their Products, 1929-1931—Concluded

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
OTHER PRODUCTS OF PETROLEUM						
Grease, axle..... lb.	7,010,528	383,513	5,341,098	288,994	4,148,459	206,770
Paraffine wax..... lb.	3,299,236	135,169	3,464,085	126,770	2,473,199	74,561
Paraffine wax candles..... lb.	393,158	85,543	383,063	79,766	429,976	79,437
Vaseline and all similar preparations of petroleum for toilet, medicinal or other purposes.....		250,753		230,800		186,29
Naphtha and products of petroleum, n.o.p., lighter than .8235 specific gravity at 60 degrees temperature..... gals.	1,828,536	297,126	1,637,160	251,743	3,443,531	329,867
Total.....		77,839,410		66,619,649		40,632,795
EXPORTS—						
Oil petroleum, crude..... gals.	28,177,495	1,548,288	19,259,585	881,452	16,277,182	677,378
Oil, coal and kerosene, refined..... gals.	1,367,241	137,160	1,460,676	138,455	504,364	52,328
Oil, gasoline and naphtha..... gals.	4,669,078	875,027	7,256,557	1,226,561	5,500,606	889,827
Oil, mineral, n.o.p..... gals.	433,634	105,426	315,779	120,231	885,122	185,177
Wax, mineral..... cwt.	11,556	62,171	16,958	74,933	9,469	31,092
Total.....		2,728,072		2,441,632		1,835,802

(a) From April 1 to December 31, 1931.

(b) From January 1 to March 31, 1931.

Table 182.—World Production of Crude Petroleum, 1929-1931

(Supplied by *Imperial Institute*)
(Long tons)

	1929	1930	1931
BRITISH EMPIRE			
United Kingdom (estimated) (c).....	166,000	164,000	143,000
Canada (b).....	141,439	192,686	194,557
Barbados.....	1,357	(a)	(a)
Trinidad (b).....	1,193,525	1,290,261	1,334,726
British Borneo (Sarawak).....	748,405	688,424	527,020
India (b).....	1,182,039	1,200,888	1,177,679
Total.....	3,430,000	3,540,000	3,380,000
FOREIGN COUNTRIES			
Czechoslovakia.....	13,645	22,436	19,424
Estonia (c).....	4,586	9,847	15,316
France.....	78,025	80,564	78,038
Germany.....	101,242	171,575	225,315
Greece.....	300	443	(a)
Italy.....	5,793	7,668	15,932
Jugoslavia.....		273	207
Poland.....	664,033	652,296	620,526
Roumania.....	4,760,581	5,700,830	6,552,652
Russia.....	14,543,600	18,327,700	22,578,700
Spain (c).....	6,221	5,715	5,608
Algeria.....	3,000	2,376	1,063
Egypt.....	267,816	280,585	280,366
Morocco (French).....	40	(a)	(a)
Mexico (b).....	6,770,876	5,989,390	5,005,815
United States (b).....	136,124,700	121,352,800	115,010,900
Argentina.....	1,319,074	1,252,722	1,678,079
Colombia (b).....	2,870,980	2,865,600	2,497,151
Ecuador.....	188,421	212,031	246,937
Peru.....	1,748,697	1,750,058	1,412,871
Venezuela.....	19,531,514	19,835,609	16,920,350
China.....	4,367	53,250	55,031
Formosa (b).....	9,253	(d)	(d)
Iraq.....	118,986	119,567	118,374
Japan.....	253,082	274,638	280,271
Netherlands East Indies.....	5,155,807	5,444,182	4,448,761
Persia.....	5,718,745	5,940,979	6,338,444
Total.....	200,300,000	190,300,000	183,300,000
World's Total.....	203,700,000	193,800,000	186,700,000

(a) Information not available.

(b) The following conversion rates have been used: 35 gallons=1 barrel and the undermentioned barrels=1 ton:—Canada, 7.9, Mexico 6.6, Trinidad 7.3, India 7.4, United States 7.4, Colombia 7.1, Formosa 7.0.

(c) Including shale oil.

(d) Included with Japan.

Table 183.—Capital Employed in the Petroleum Industry in Canada, by Provinces, 1930 and 1931

	1930				1931			
	Ontario	Saskatchewan	Alberta	Canada	Ontario	Manitoba and Saskatchewan	Alberta	Canada
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant machinery and tools.....	1,527,737	181,117	52,902,369	54,611,223	1,507,549	64,891	49,487,161	51,059,601
Cost of supplies and stocks on hand.....	15,891	6,000	1,860,003	1,881,894	11,397	.....	1,175,499	1,186,895
Cash, trading and operating accounts and bills receivable....	2,393	11,481	6,793,253	6,807,127	4,406	2,476	5,367,571	5,374,453
Total.....	1,546,021	198,598	61,555,625	63,300,244	1,523,352	67,367	59,030,231	57,620,950

Table 184.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1930							
Ontario.....	13	1	111	125	10,750	84,202	94,952
Manitoba and Saskatchewan.....	1	.....	22	23	900	20,878	21,778
Alberta.....	188	42	1,491	1,721	447,762	2,773,262	3,221,024
Canada.....	202	43	1,624	1,869	459,412	2,878,342	3,337,754
1931							
Ontario.....	7	1	115	123	6,695	82,895	89,590
Manitoba and Saskatchewan.....	2	.....	13	15	1,594	19,671	21,265
Alberta.....	129	27	915	1,071	369,031	1,163,631	1,523,662
Canada.....	138	28	1,043	1,209	368,320	1,266,197	1,634,517

* See footnote on page 35.

Table 185.—Casing used in the Petroleum Industry in Alberta, 1930 and 1931

Size	1930		1931		Size	1930		1931	
	Weight	Length	Weight	Length		Weight	Length	Weight	Length
Inches	Pounds	Feet	Pounds	Feet	Inches	Pounds	Feet	Pounds	Feet
2	.....	.....	3,976	994	10½	1,576,787	35,148	691,244	15,554
4½	12,130	1,213	10,120	1,012	11½	181,329	3,092	.....	.....
4½	196,720	12,295	.....	.....	12½	713,126	13,845	148,300	2,966
4½	71,536	4,471	74,864	4,679	13	56,912	1,138	91,125	1,822
5	344,036	19,070	7,734	452	13½	2,219,652	40,558	943,142	16,847
5½	8,280	414	.....	.....	15	10,205	157	.....	.....
6	254,984	9,128	.....	.....	15½	955,796	13,032	342,720	4,896
6½	1,514,498	54,183	254,688	9,096	16	994,828	13,555	135,641	1,822
6½	1,428,602	51,021	640,159	22,863	16½	3,975	53	.....	.....
6½	.....	.....	127,820	4,565	18	28,320	328	.....	.....
8	161,976	5,042	.....	.....	18½	387,686	4,635	40,989	525
8½	194,148	5,393	.....	.....	20	110,070	1,223	23,940	266
8½	1,565,744	45,626	121,520	4,340	20½	9,900	110	.....	.....
8½	1,344,340	9,565	.....	.....	21½	95,081	928	55,353	598
8½	1,818,267	50,945	2,484,864	69,841	24	15,840	144	.....	.....
10	1,216,727	26,914	386,288	8,584	24½	12,789	127	.....	.....
10½	113,750	2,500	.....	.....	Total	16,618,034	425,853	6,584,487	171,722

2. The Petroleum Products Industry in Canada

Twenty plants in Canada were engaged during 1931 in the refining of oils for the production of gasoline, fuel oil, kerosene, lubricating oils, asphalt, waxes, petroleum coke and grease. These refineries had a total capacity of 133,350 barrels of crude oil per day and were located at strategic points across the Dominion for convenience in marketing their products. During 1931, the Canadian refineries treated 49.7 million gallons of oil from Canadian wells (including naphtha

from the Turner Valley field in Alberta), and 1,025.1 million gallons of oil imported principally from the United States, Colombia, Peru, Venezuela and Trinidad. Gasoline production amounted to 469.9 million gallons, of which 40.8 per cent or 191.6 million gallons were made by the cracking process. Fuel and gas oil sales totalled 374.2 million gallons; in addition to which the refineries used 54.55 million gallons for fuel purposes.

Twelve plants were engaged in compounding lubricating oils and greases in 1931. These plants produced products worth \$570,219 during the year.

Capital employed in Canada's petroleum refining and lubricating oil compounding industries in 1931 amounted to \$68,136,281. Employment was furnished to 4,122 employees whose salaries and wages totalled \$6,214,745. Fuel and electricity consumed during the year cost \$3,378,599. Materials used in 1931 were valued at \$50,617,742.

Table 186.—Materials Used and Products Made by the Oil Refineries of Canada, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
MATERIALS USED—						
Petroleum refining—						
Crude oil, product of Canadian wells..... imp. gal.	37,338,402	4,026,272	51,522,864	5,410,237	49,668,529	4,234,481
Crude oil, imported..... imp. gal.	1,035,490,094	68,082,715	1,012,912,110	62,230,738	1,025,119,509	43,094,937
Imported fuel and gas oils for use in cracking process..... imp. gal.	440,475	18,270				
Sulphuric acid (66° Bé not made by firm reporting)..... lb.	49,610,612	425,853	49,250,621	447,382	31,160,023	315,490
Sulphur (not used in acid manufacture) lb.	201,032	6,770	901,759	37,959	126,186	4,278
Caustic soda..... lb.	6,699,874	243,319	5,801,722	201,420	4,358,920	144,191
Soda ash..... lb.	404,185	9,315	352,841	8,285	331,713	7,602
Litharge..... lb.	799,464	69,698	498,055	41,666	257,371	20,164
Fullers' earth..... lb.	18,513,820	207,931	20,102,387	241,793	16,157,582	201,361
Compounding materials.....		758,246		521,980		386,342
Other materials.....				154,462		134,791
Shipping containers.....		2,440,793		2,011,927		1,809,786
Total.....		76,289,182		71,307,879		59,353,423
Lubricating oils and greases—Total.....		572,757		492,550		264,319
Grand total.....		76,861,939		71,800,429		59,617,742
PRODUCTS MADE—						
Petroleum refining—						
Made for sale—						
Gasoline (a) straight run..... imp. gal.	303,911,713	43,250,498	276,238,369	37,337,958	278,215,832	29,876,513
(b) by cracking process..... imp. gal.	132,646,696	20,242,805	169,314,761	23,445,341	191,632,502	20,224,691
Fuel and gas oils..... imp. gal.	387,069,829	15,586,290	375,255,886	14,231,129	374,201,530	12,400,027
V.M. & P. or solvent naphtha..... imp. gal.	7,257,910	974,348	7,150,672	870,037	8,468,995	769,201
Kerosene..... imp. gal.	49,297,417	6,870,711	43,509,487	5,378,830	39,421,314	4,125,272
Lubricating oils..... imp. gal.	22,900,238	3,943,418	18,042,269	2,909,506	15,157,068	2,548,923
Grease..... lb.	17,042,195	316,848	13,465,366	268,453	9,390,866	187,216
Tar..... lb.	1,032,500	8,260	1,017,500	8,140	902,000	9,020
Asphalt..... imp. gal.	35,233,347	2,688,579	37,470,666	1,691,629	37,937,082	1,836,403
Petroleum coke..... tons	84,108	465,753	68,549	392,945	52,310	280,660
Wax and candles..... lb.	10,776,352	537,886	10,153,924	453,591	10,097,369	368,677
Other products.....		258,113		241,053		186,963
Total for sale.....		95,143,509		87,528,612		72,813,563
Made for own use—						
Gasoline (a) straight run..... imp. gal.	62,205	8,813	46,287	6,273	77,041	8,039
Fuel and gas oils (except for cracking)..... imp. gal.	61,629,931	2,308,933	59,308,393	2,197,389	54,551,901	1,640,400
V.M. & P. or solvent naphtha..... imp. gal.	11,371	1,490	14,288	1,690	22,462	2,252
Kerosene..... imp. gal.	64,964	8,763	97,294	13,022	44,245	4,810
Lubricating oils..... imp. gal.	24,060	4,191	42,621	6,384	54,823	8,852
Petroleum coke..... tons	25,408	140,230	23,538	124,363	20,029	96,676
Still gas..... M cu. ft.	3,140,187	708,781	3,529,319	874,151	5,161,905	980,628
Acid sludge.....		53,909		57,827		33,202
Other products.....		5,531				
Total for own use.....		3,240,671		3,281,099		2,774,859
Total Petroleum refining.....		98,384,180		90,809,711		75,588,425
Fuel and gas oils made and used in pressure cracking process..... imp. gal.	351,436,512		389,719,223		441,297,994	
Lubricating oils and greases—						
Lubricating oils..... imp. gal.	1,522,045	745,876	1,682,234	753,386	749,333	477,131
Lubricating greases..... lb.	688,384	92,004	719,505	71,288	537,655	56,547
Soaps..... lb.	465,064	66,395	374,854	34,841	308,690	27,283
Other products.....		119,859		117,979		9,258
Total lubricating oils and greases.....		1,024,134		977,494		570,219
Grand total.....		99,408,314		91,787,205		76,158,644

CHAPTER EIGHT

THE NON-METAL MINING INDUSTRIES IN CANADA. (Other than Fuels)

Including detailed data relating to operations in the following industries:—

Abrasives	Miscellaneous—	Manganese bog
Asbestos	Actinolite	Mineral waters
Feldspar and Quartz	Barytes	Natro-alunite
Gypsum	Bituminous sands	Phosphate
Iron oxides (ochre)	Fluorspar	Pyrites
Mica	Graphite	Silica brick
Salt	Lithium minerals	Sodium carbonate
Talc and soapstone	Magnesite	Sodium sulphate
	Magnesium sulphate	

(1) ABRASIVES, NATURAL

This group of industries includes those having produced or producing corundum, diatomite, garnets, grinding pebbles, grindstones, pulpstones and scythestones, and volcanic dust.

Corundum.—Corundum (Al_2O_3) crystals are found in an area embracing several townships in Renfrew and Hastings counties in the province of Ontario. The industry made its appearance there in 1900 and production reached a maximum in 1906. Corundum mining practically ceased with the perfection and production of artificial abrasives by the electric furnace. In 1921 grain corundum amounting to 403 tons valued at \$55,965 was exported to the United States; since that date no shipments of this mineral have been reported. For historical table of Canadian corundum production see 1930 report on Mineral Production of Canada.

Diatomite.—Diatomite, also known as diatomaceous earth and Kieselguhr, is composed of siliceous skeletons of algae. The largest deposits are of Tertiary age and occur commonly as massive chalk like beds, usually interstratified with thin seams of clay, sand, volcanic dust, flint, etc. These are typical of western North America. There are other or recent types of freshwater origin occurring under water or in bogs and swamps. All the known eastern Canadian and the majority of the eastern United States diatomite deposits are of the recent freshwater type.

The lightness and inertness of diatomite make it valuable for filtration and certain types of filling. Prior to 1928 the Canadian Production of diatomite was obtained from deposits in the province of Nova Scotia. In 1896, shipments of diatomite totalling 644 tons were made; this was the first official record of production in Canada. Deposits at Silica lake and near St. Ann's Cape Breton, have been worked. Development of diatomite was carried on in 1926 at East New Annan, Nova Scotia, and in 1927 shipments of this material amounting to 266 tons were made.

In 1931 shipments were made from deposits at East New Annan and Little River, Nova Scotia, Baysville, Central Ontario and Quesnel, British Columbia. The total production for the year was 1,610 tons valued at \$32,789 as compared with 554 tons worth \$13,247 in 1930.

Its three major uses are: as a heat and sound insulator, as a filter medium and as an admixture in concrete. It is also used in the manufacture of hard asphaltum and rubber products, metal polishes, absorbents, etc.

Garnets.—A deposit of garnets in Ashby township, Ontario, was operated during 1923 and 1,250 tons of garnet concentrates and crude garnets were shipped to Niagara Falls, New York, for use as an abrasive material. In 1924, a shipment of 360 tons of garnets was made but there has been no production from this deposit since that year. In 1927, development work was conducted on a garnet deposit in Joly township, Labelle county, Quebec, and a shipment of two tons was made.

There was no production of garnets in Canada in 1931. The Labelle Nickel and Garnet Co. Ltd., conducted development and construction work at a garnet deposit in the Canton de Joly, province of Quebec. Approximately 90 per cent of the garnets mined throughout the world is used for the manufacture of abrasive papers and cloth.

Grinding Pebbles.—Grinding pebbles were obtained for a number of years near Jackfish, on the north shore of Lake Superior. During 1920 the production amounted to 560 tons; in 1925 the total was 105 tons and in 1926 shipments were considerably lower amounting to only 64 tons. No shipments have been made from Canadian deposits since 1926. Artificially shaped pebbles are now produced in Minnesota from massive flint or quartzite.

Grindstones, Pulpstones and Scythestones.—The production of grindstones, pulpstones and scythestones from Canadian quarries during 1931 amounted to 621 tons valued at \$38,103 as compared with 830 tons worth \$62,021 in 1930. Grindstones were produced at Stonehaven, New Brunswick; scythestones at Shediac and Stonehaven, New Brunswick, and pulpstones in British Columbia and New Brunswick.

It is reported that the use of artificial pulpstones constructed of bonded silicon carbide segments is gradually increasing. For historical data relating to Canadian grindstone production see 1929 annual report on Mineral Production of Canada.

Volcanic Dust.—Volcanic dust is used for purposes similar to ground pumice, particularly in the manufacture of cleansers and scouring powders and in some instances as a substitute for fuller's earth in the refining of hard oils and fats.

The extensive beds of volcanic dust near Waldeck, Saskatchewan, were discovered in 1918. Shipments have been made from these deposits annually for the past eight years. In 1931 production in Canada came entirely from these deposits and amounted to 128 tons valued at \$2,560 as compared with 242 tons at \$4,840 in 1930.

At Williams Lake, in British Columbia, a small tonnage of volcanic ash rock was mined during 1930.

The 8 firms operating in the natural abrasives industry in Canada during 1931 reported a capital investment of \$1,310,108; salaried employees and wage-earners totalled 31 with combined earnings amounting to \$25,837. Fuel and electricity costs were \$3,906.

Table 187.—Capital Employed in the Natural Abrasives Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
Capital employed as represented by:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	256,880	513,751
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	30,295	2,472
†(c) Inventory value of finished products on hand.....		16,559
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	57,927	36,990
Total.....	345,102	569,772

†1930 included in item (b).

Table 188.—Employees, Salaries and Wages in the Natural Abrasives Industry in Canada, 1930 and 1931

—	1930				1931			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	8	3	11	18,090	6	3	9	11,856
Wage earners.....	34		34	24,777	22		22	13,981
Total.....	42	3	45	42,867	28	3	31	25,837

Table 189.—Production of Diatomite in Canada, 1922-1931

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	219	5,781	1928.....	368	8,960
1923.....	130	3,250	1929.....	429	10,330
1924.....	33	838	1930.....	554	13,247
1925-1926.....			1931.....	1,610	32,789
1927.....	266	6,650			

NOTE.—For years 1896 to 1921 see previous reports.

Table 190.—Production of Grindstones in Canada, by Provinces, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada 1928)

Year	Nova Scotia		New Brunswick		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1922.....	102	3,692	735	26,600	837	30,292
1923.....	254	7,906	1,463	43,577	1,717	51,483
1924.....	338	12,525	1,693	56,586	2,031	69,111
1925.....	439	16,723	1,296	45,061	1,735	61,784
1926.....	311	15,136	1,202	43,850	1,513	58,986
1927.....	11	220	1,306	47,255	1,317	47,475
1928.....			1,250	45,901	1,250	45,901
1929.....	6	110	1,032	37,291	1,038	37,401
1930.....	6	110	229	9,764	235	9,874
1931.....			198	8,164	198	8,164

Table 191.—Production of Pulpstones and Sharpening Stones in Canada, 1922-1931

(For the years 1892 to 1921 see Mineral Production of Canada, 1928)

Year	Pulpstones		Sharpening stones		Year	Pulpstones		Sharpening stones	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1922.....	150	12,000	18	1,450	1927.....	911	75,242	23	2,300
1923.....	260	25,100	35	3,500	1928.....	581	52,659	24	2,400
1924.....	624	58,113	36	3,600	1929.....	754	62,336	155	6,617
1925.....	781	57,781	46	4,600	1930.....	573	49,897	22	2,250
1926.....	1,155	89,541	27	2,700	1931.....	342	27,305	81	2,634

Table 192.—Production of Grindstones, Pulpstones and Scythestones in Canada, by Provinces, 1929-1931

Province	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Nova Scotia.....	6	110	6	100		
New Brunswick.....	1,731	103,514	495	35,689	299	12,308
British Columbia.....	210	2,730	329	26,222	322	25,795
Total.....	1,947	106,354	830	62,021	621	38,103

Table 193.—Imports into Canada and Exports of Abrasives, 1929-1931

Item	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
IMPORTS—						
Abrabives—						
Artificial abrasives in bulk, crushed or ground, when imported for use in the manufacture of abrasive wheels and polishing composition.....		251,704		205,042		184,280
Carborundum wheels or stones not further manufactured than moulded and burned.....		219,475		57,731		
Diamond dust or bort, and black diamonds for borers.....		2,727,285		1,440,871		450,148
Diatomaceous earth or infusorial earth (Kieselguhr) ground or unground cwt. 23,857	40,539	6,582	12,004	17,000	25,788	
Emery in bulk, crushed or ground.....	54,433		37,353		26,280	
Grinding wheels, manufactured by bonding together of either natural or artificial abrasives.....		133,779		150,503		125,673
Grinding stones or blocks manufactured by the bonding together of either natural or artificial abrasives.....		99,036		127,795		28,969
Grindstones, not mounted, and not less than 36 inches in diameter.....		424,613		229,436		111,770
Grindstones, n.o.p.....		23,769		12,134		7,228
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		35,955		36,089		34,542
Sand paper, glass, flint and emery paper or emery cloth.....		498,328		342,771		201,277
Iron sand or globules or iron shot and dry putty, for use in polishing glass or granite, or for sawing stone.....		41,934		41,758		25,319
Manufactures of emery or of artificial abrasives, n.o.p.....				*60		44,429
Burrstones in blocks, rough or unmanufactured, not bound up or prepared for binding into mill-stones..... No. 30		1,310	21	1,097		
Total.....		4,552,160		2,694,554		1,265,703
EXPORTS—						
Grindstones, manufactured.....		36,536		11,674		10,776
Abrabives—						
Natural, n.o.p., in ore or bulk... cwt. 8,287	9,757	7,455	8,972	14,372	14,185	
Artificial, crude, including carborundum..... cwt. 1,571,816	3,815,804	1,128,775	2,842,289	851,206	1,981,713	
Artificial, made up into wheels, stones, etc.....		53,666		36,489		19,576
Total.....		3,915,763		2,899,424		2,026,250

*From December, 1930.

2. ABRASIVES, ARTIFICIAL, AND ABRASIVE PRODUCTS

Manufactures of artificial abrasives and abrasive products in Canada were valued at \$4,857,914 in 1931. This output was 25 per cent less than the corresponding value of \$6,450,351 in 1930. Among the principal products made in this industry were 35,781 tons of fused alumina at \$3,007,307 and 10,754 tons of silicon carbide at \$1,060,712, abrasive wheels worth \$347,345, and other commodities such as ferro-silicon, abrasive cloth and paper, artificial pulpstones and sharpening stones, refractories, files and magnesia.

For 1931, reports were received from 14 plants of which 13 were in Ontario and 1 in Quebec. Capital employed by these firms amounted to \$6,070,652. The average number of employees was 691 and salaries and wages for the year totalled \$982,820. Materials used in manufacturing, exclusive of fuel, cost \$1,709,983 at the works, and the value added by manufacturing processes was \$3,147,931.

ASBESTOS

The Canadian asbestos mining industry continued to feel keenly in 1931 the effects of the world-wide economic depression to which was added the increasing competition of Russian and Rhodesian fibre.

In 1931 the quantity of Quebec asbestos fibre placed on the market was 164,296 tons valued at \$4,812,886, a decrease of 77,818 tons in volume and \$3,577,277 in value as compared with 1930. The total volume of asbestos-bearing rock mined and hoisted during the year was 2,274,048 tons; 2,164,060 tons were milled. A high record for the yearly average fibre extraction was established; this fact indicates that there is no decline in the quality of rock mined.

The principal asbestos of commerce occurs in serpentine. That from Canada, and especially from Thetford Mines, is found to be more uniform in requisite commercial qualities and therefore more desirable and valuable than asbestos from most other countries.

For several years past, extensive diamond-drill campaigns have been attempted in the Quebec asbestos-bearing areas, and it is stated that ore reserves are now being definitely blocked out; open workings having a maximum depth of nearly 400 feet at the King mine, underground work at the 500 foot level, and drill cores from 1,700 feet deep have proved no variation in content or grade with depth.

The Rhodesian Chamber of Mines reports the 1931 production of Rhodesian asbestos at 24,042 tons valued at £386,494; this represents a considerable decline from a production of 37,766 tons in 1930. In 1931 the Chamber suggested to the Rhodesian government that it should form a central committee for Southern Rhodesia for the collection and tabulation of data relating to the mineral resources of the colony in accordance with the agreement arrived at in 1930 at the Imperial Conference of Premiers in London.

In the Union of South Africa the Cape Asbestos Company Limited reports that the acute difficulties experienced in the asbestos industry during 1931 are reflected in the reduction of the company's net profit to £13,141 as compared with £26,210 in 1930; operations at the Blue Asbestos mines were curtailed and those of Egnep Limited further drastically reduced.

The economic review of the Soviet Union states that an all-union industrial combine for the production and refining of asbestos and for the manufacture of asbestos products was recently organized. This is known as Soyuzasbest (United Asbestos Industry). Sales of Russian asbestos in the United States during 1931 are reported by the Amtorg Trading Corporation at \$193,000 as compared with \$43,000 in 1930. Aside from the most important Russian deposits, in the Urals, there are other reserves in the North Caucasus and the Buriat-Mongolian Republic. Russian asbestos exports totalled 15,749 tons in 1930, of which Germany took 13,805 tons, the United States, 980 tons, and Great Britain, 536 tons. Pre-war Russian exports reached their peak in 1913 at 12,399 tons.

It is reported in "Asbestos" that Admiralty Alaska Asbestos Incorporated will commence asbestos mining operation at a property on Admiralty Island, Southeastern Alaska; manufacturing will be conducted at Portland, Oregon.

A new company, Tasmanian Asbestos Mining Company, has been formed to develop extensive asbestos deposits at Beaconsfield, Tasmania. The asbestos from this area is reported to equal, in general quality, that now imported into Australia.

Possible new uses for asbestos have been recently announced, the mineral being utilized in the manufacture of protected metals by bonding. Advantages claimed include their resistance to heat and fire, their increased insulating value over bare metals and their soundless character.

Asbestos fibres of various grades are constituent components of many manufactured products. The longer fibres are used chiefly for spinning yarns, cords, and the production of woven fabrics. The short and very short fibres and a limited amount of residual sand are used with other constituents principally to produce a long line of building products and moulded articles.

A Committee formed by the asbestos mine operators of Quebec established in 1931 a uniform standard classification to designate and name or mark each quality of fibre produced by the Quebec mines. Asbestos mine products are now divided into two classes:—"crude asbestos" and "milled asbestos" respectively defined as follows:—

"Crude asbestos" consists of the hand selected cross-vein material essentially in its native or unfibried form.

"Milled asbestos" consists of all grades produced by mechanical treatment of asbestos ore.

For an historical summary of Canadian asbestos mining see the 1928 report on the Mineral Production of Canada.

Table 194.—Capital Employed in the Asbestos Industry in Canada, 1929-1931

	1929	1930	1931
	\$	\$	\$
Capital employed as represented by:			
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	29,776,658	32,304,389	33,657,879
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	1,893,501	1,884,669	1,009,423
(c) Inventory value of finished products on hand.....			1,631,891
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	1,578,798	908,814	3,864,812
Total.....	33,248,957	35,097,872	40,164,005

Table 195.—Employees, Salaries and Wages in the Asbestos Industry in Canada, 1930 and 1931

—	1930				1931			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried Employees.....	195	35	230	475,167	138	34	172	405,060
Wage-Earners—								
Mine.....	1,384		1,384		869		869	
Mill.....	1,156		1,156		634		634	
Total.....	2,540		2,540	2,999,048	1,503		1,503	1,431,055
Grand total.....	2,735	35	2,770	3,474,215	1,641	34	1,675	1,836,115

Table 196.—*Production of Asbestos in Canada, 1922-1931

(For the years 1880 to 1921 see Mineral Production of Canada, 1928)

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1922.....	163,706	5,552,723	1927.....	274,778	10,621,013
1923.....	231,482	7,522,506	1928.....	273,033	11,238,360
1924.....	225,744	6,710,830	1929.....	306,055	13,172,581
1925.....	273,524	8,977,546	1930.....	242,114	8,390,163
1926.....	279,403	10,099,423	1931.....	164,296	4,812,886

*Sales.

Table 197.—Mill Output and Shipments of Canadian Asbestos, 1930 and 1931

Classification	1930				1931			
	Total output	Sold or shipped			Total output	Sold or shipped		
		Quantity	Total sales value at mill	Average value per ton		Quantity	Total sales value at mill	Average value per ton
	tons	tons	\$	\$ cts.	tons	tons	\$	\$
Crude No. 1.....	653	720	345,750	480-21	389	206	88,880	431-46
Crude No. 2.....	2,882	1,440	411,179	285-54	1,985	543	117,478	216-35
Other crudes.....	436	161	10,914	67-79	92			
Spinning stocks.....	14,432	10,411	1,473,522	141-52	11,329	8,560	917,776	107-22
Shingle stocks.....	22,590	19,909	1,406,385	70-64	10,956	15,988	938,857	58-72
Mill board and paper stocks.....	80,129	79,739	2,817,295	35-33				
Fillers, floats and other short fibres.....	119,290	129,734	1,925,118	14-84				
Paper stocks.....					37,251	39,867	1,381,888	34-66
Waste, stucco or plaster.....					6,328	6,309	159,043	25-20
Refuse or shorts.....					82,907	92,823	1,208,964	13-02
Total.....	240,412	242,114	8,390,163		151,237	164,296	4,812,886	29-29
Sand and gravel (*).....	40,729	40,309	12,413	0-31	7,209	7,209	5,952	0-83

NOTE.—There were some slight changes in the classification in 1931.

*This production is included under the sand and gravel industry.

Table 198.—Imports of Asbestos into Canada, 1929-1931

Item	1929		1930		1931	
	Tons	Value \$	Tons	Value \$	Tons	Value \$
Asbestos in any form other than crude, and all manufactures of, n.o.p.		897,229		597,915		312,484
Asbestos packing	113	116,207	87	82,111	69	63,455
Asbestos brake and clutch lining				193,824		241,880
Total		1,013,436		873,850		617,819

Table 199.—Exports of Canadian Asbestos by Countries of Destination, 1929-1931

Commodity and Destination	1929		1930		1931	
	Tons	Value \$	Tons	Value \$	Tons	Value \$
ASBESTOS—						
Great Britain	3,508	350,410	3,528	288,531	1,801	140,024
United States	91,876	6,033,946	66,857	3,723,462	46,002	2,171,000
Australia	1,463	137,087	481	47,979	304	20,010
Belgium	14,291	987,896	10,836	769,002	7,831	533,737
France	6,583	504,539	5,545	389,890	3,327	244,380
Germany	11,329	1,189,580	4,278	410,083	4,714	399,584
Italy	2,424	234,971	3,076	274,162	1,264	116,359
Japan	10,557	567,800	8,605	476,199	4,539	227,803
Netherlands	1,240	87,210	1,024	60,971	977	67,840
Spain	92	6,560	32	1,660	94	5,080
Other countries	362	27,209			50	3,500
Total	143,725	10,127,208	104,262	6,441,939	70,903	3,929,317
SAND AND WASTE—						
Great Britain	2,335	55,850	3,104	75,539	1,015	22,492
United States	140,588	2,320,084	121,605	1,791,306	83,082	1,130,159
Germany	2,667	66,625	2,310	51,115	1,568	34,717
Netherlands	1,201	30,025	1,367	31,590	870	21,380
Other countries	1,514	34,890	2,852	61,768	2,000	36,578
Total	148,305	2,507,474	131,238	2,011,318	88,535	1,245,326
ASBESTOS MANUFACTURES INCLUDING ASBESTOS ROOFING—						
Great Britain		58,769		139,460		66,078
United States		21,556		14,204		10,751
British South Africa				198		
Newfoundland		4,707		15,203		13,684
New Zealand		592		735		764
Other countries		28,328		29,983		19,964
Total		113,952		199,783		111,241

Table 200.—World Production of Asbestos, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country	1929	1930	1931	Country.	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES			
Southern Rhodesia	38,066	33,720	21,466	Finland (Amphibole)	1,600	1,061	(a)
Union of South Africa (b)	28,717	23,083	11,480	France	740	(a)	(a)
Canada				Italy	2,586	710	(a)
Chrysotile (including sand, etc)	294,804	251,019	141,470	Russia	38,425	53,228	66,000
Crude	4,286	3,545	2,202	Portuguese East Africa		16	(a)
Spinning stocks	17,514	12,886	10,115	United States (Sales)—			
Shingle stocks	30,391	20,170	9,782	Amphibole	1,046	526	331
Millboard and paper stocks	82,046	71,544	33,260	Chrysotile	1,771	3,262	2
Fillers, floats and other short fibres	143,624	106,509	79,674	Japan (estimated)	1,000	1,000	
Sand, gravel and crushed rock	16,943	36,365	6,437	Mozambique		16	(a)
Actinolite	27	30	31	China	273	310	260
Cyprus	14,110	7,256	1,138	Greece		2	10
India	318	33	6	Turkey			4
Australia	256	82	128	Total	38,000	61,000	
Total	376,000	315,000	176,000	World's Total	414,000	376,000	

(a) Information not available.

(b) Production.

FELDSPAR AND QUARTZ

The first record of production in the feldspar industry in Canada dates back to about 1890, approximately 700 tons were mined in that year. This was followed by an increase until the maximum output of 44,804 tons was reached in 1924.

Most of the feldspar mined in Canada is of the potash variety known as orthoclase or microcline, albite a soda feldspar also occurs; there is, however, comparatively little demand for this mineral.

Feldspar production in Canada during 1931 amounted to 18,343 short tons valued at \$186,961 as compared with 26,796 short tons worth \$268,469 in 1930; output of quartz in 1931 totalled 195,724 short tons valued at \$303,158 as against 226,200 tons worth \$418,127 during the previous year. Owing to the very close physical association of quartz and feldspar in many Canadian deposits, it has been found very difficult for the operator to make a separate division of data pertaining to the mining of each individual mineral and for this reason the general statistics relating to capital, employment, fuel and electricity, etc., have been combined.

Production of feldspar during 1931 was confined to the provinces of Quebec and Ontario. Several producers in both provinces shipped the crude material to either Canadian or foreign grinding plants. Two Canadian companies, the Canadian Flint and Spar Company, Buckingham, Quebec, and the Frontenac Floor and Wall Tile Company, Kingston, Ontario, operate grinding mills and market a high grade ground feldspar, the latter company also utilizes considerable quantities of feldspar in the manufacture of floor and wall tile. In June, 1931, the United States Tariff Commission commenced an investigation into the tariff rate on feldspar imported from Canada; as a result of this it was announced in December that the duty on crude feldspar was reduced from \$1.00 a ton to 50 cents a ton; there was no change in the rate for ground feldspar which is subject to a 30 per cent duty.

In Nova Scotia silica rock was crushed and ground for the manufacture of silica brick by the Dominion Steel and Coal Company; in Quebec considerable quantities of quartz were mined and shipped by various producers to the Electric Reduction Company in Buckingham; quartz and feldspar were ground in this province by the Canadian Flint and Spar Company Limited while the Ottawa Silica and Sandstone Co. Limited produced silica sand for moulding, etc., at a crushing plant located near Templeton. Rock from quarries at St. Canute was employed by the Canadian Carborundum Company Limited for the production of various grades of silica sand. Canadian Kaolin Silica Products crushed and classified silica rock in Papineau County.

Dominion Mines & Quarries exported a crushed and screened quartz from the Killarney quarry situated on the north shore of Lake Huron, Ontario. From a quarry on the Algoma Central Railway, Wright and Company shipped crude quartz to Sault Ste. Marie for the manufacture of silica brick; in the Sudbury area siliceous gravels were employed in the fluxing of nickel-copper ores. Quartz was mined in both Manitoba and British Columbia for use in metallurgical plants.

The principal requirement for feldspar for use in glass or other ceramic industries is that it should fuse to a uniform white colour entirely free from specks or spots. All iron-bearing minerals are detrimental and care should be taken to keep the content of biotite, garnet and black tourmaline at a minimum. The quartz content of commercial spar varies considerably. For high grade pottery it is limited to about 5 per cent, but for ordinary grades it may be 15 or 20 per cent or even higher. A high alumina content is desirable in glass making.

Recorded uses for which quartz was employed in the United States during 1930 include: tile and other ceramic products, flux in steel foundries, roofing, as a base in paints, cleansers, sandpaper, refractories and abrasives, packing acid towers and filters, pulp burrs, matches, and fused quartz lenses. Natural silica sand in a very pure form is largely used in the manufacture of glass.

Recent laboratory experiments conducted in the engineering experiment station, University of Utah, are reported to show that a practically complete separation of quartz and feldspar by flotation is possible. Flotation follows proper grinding and uses oleates as collecting reagents. It is stated that if results on a commercial scale are satisfactory, they would make possible the opening up of new deposits of quartz, feldspar and mica which hitherto have been practically valueless.

Table 201.—Capital Employed in the Feldspar and Quartz Mining Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated value if rented.)	745,966	980,287
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	94,676	87,907
†(c) Inventory value of finished products on hand.....		23,959
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	29,846	250,515
Total.....	870,488	1,342,668

†Included with item (b) in 1930.

Table 202.—Employees, Salaries and Wages in the Feldspar and Quartz Mining Industry in Canada, 1930 and 1931

	1930				1931			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	24	2	26	45,501	23	2	25	31,462
Wage-earners.....	403		403	211,887	141		141	104,347
Total.....	427	2	429	257,388	164	2	166	135,809

Table 203.—Production of Feldspar in Canada, by Provinces, 1922-1931

(For the years 1890-1921 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1922.....	12,472	127,826	15,255	120,576	27,727	248,402
1923.....	12,026	102,779	17,199	134,822	29,225	237,601
1924.....	16,147	142,118	28,657	216,422	44,804	358,540
1925.....	11,287	94,730	17,394	141,059	28,681	235,789
1926.....	13,168	111,136	22,783	199,102	35,951	310,238
1927.....	12,730	104,618	17,119	154,533	29,849	259,151
1928.....	12,943	104,789	18,954	180,153	31,897	284,942
1929.....	15,790	133,492	21,737	206,979	37,527	340,471
1930.....	17,074	163,802	9,722	104,667	26,796	268,469
1931.....	10,381	86,842	7,962	100,119	18,343	186,961

Table 204.—Production in Canada, Imports and Exports of Feldspar, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	15,790	133,492	17,074	163,802	10,381	86,842
Ontario.....	21,737	206,979	9,722	104,667	7,962	100,119
Total.....	37,527	340,471	26,796	268,469	18,343	186,961
IMPORTS.....	3,955	65,997	3,177	53,341	1,877	37,297
EXPORTS.....	29,896	242,915	21,183	165,482	10,975	88,913

Table 205.—Production of Quartz in Canada, 1922-1931

(For the years 1890 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	109,947	208,598	1927.....	233,984	496,364
1923.....	264,076	599,250	1928.....	282,522	523,933
1924.....	150,896	323,156	1929.....	265,949	561,527
1925.....	197,224	363,612	1930.....	226,200	418,127
1926.....	232,082	553,161	1931.....	195,724	303,158

Table 206.—Production in Canada, and Imports of Quartz, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Nova Scotia.....	11,845	31,388	8,057	18,494	3,116	6,836
Quebec.....	46,444	132,532	49,561	119,668	26,987	69,759
Ontario.....	187,973	316,050	167,487	274,674	97,888	148,642
Manitoba.....	10,045	35,610			67,214	76,624
British Columbia.....	9,642	45,947	1,095	5,291	519	1,297
Total.....	265,949	561,527	226,200	418,127	195,724	303,158
IMPORTS—						
Silica Sand—for glass, etc.—	233,962	490,558	164,349	352,796	107,712	235,191
Silex or crystallized quartz, ground or un-						
ground.....	3,995	79,653	5,040	111,473	6,359	141,818
Flint and ground flint stones.....	3,595	39,272	3,878	37,811	2,616	23,653
Silica firebrick—90% silica.....		330,592		315,039		234,909

Table 207.—World Production of Feldspar, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country.	1929	1930	1931	Country.	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom (China				Italy.....	6,700	5,659	(a)
stone).....	64,558	62,920	42,650	Norway (Exports).....	26,104	19,608	14,866
Canada.....	33,506	23,925	16,378	Roumania.....	2,440	1,932	100
Australia.....	78	67	205	Sweden.....	38,475	37,986	32,590
India.....			334	United States (sales).....	197,699	171,788	147,119
Total.....	98,142	86,912	59,567	Argentina.....	420	193	169
FOREIGN COUNTRIES.				Manchuria.....	344	(a)	(a)
Czechoslovakia (estimated)	30,900	30,000	30,000	Total.....	322,309	272,846	229,831
Finland.....	452	611	66	Grand total.....	421,451	359,758	289,398
France.....	12,100	(a)	(a)				
Germany (Bavaria).....	7,575	5,069	4,921				
				(a) Data not available.			

GYPSUM

The production of gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is one of Canada's oldest industries. Up to the beginning of this century, Nova Scotia, New Brunswick and Ontario constituted the producing provinces. Manitoba commenced production in 1901, and ten years later, gypsum mining was started in British Columbia. The production of gypsum from Canadian deposits during 1931 amounted to 863,752 short tons valued at \$2,111,517 as compared with 1,070,968 tons worth \$2,818,788 in 1930. Gypsum quarried during the year totalled 882,880 tons of which 167,335 tons or 18.9 per cent was calcined in Canada, this represents an increase of 3.6 per cent in the quantity of gypsum calcined in the Dominion over that of the previous year.

Gypsum is mined or quarried in Nova Scotia, New Brunswick, Ontario, Manitoba and British Columbia. There are about 52 distinct areas in Nova Scotia containing gypsum; these cover approximately 625 square miles; anhydrite, an anhydrous calcium sulphate also occurs in extensive deposits in the Maritime Provinces, in Ontario, in Manitoba, in Alberta and also

in British Columbia. Considerable quantities of this mineral have been shipped from Nova Scotia during recent years. It is ground and used in the southern United States as a fertilizer for peanut crops; it is also used in England and Europe in the process of making ammonium sulphate for fertilizer purposes. Interest has lately centred in the use of anhydrite for the manufacture of commercial plasters.

At Iona, Cape Breton, Nova Scotia, gypsum is calcined and marketed by the Iona Gypsum Products Limited as: finished, hard, neat and dental plasters throughout the Maritime Provinces, Quebec and Ontario; quarries in Nova Scotia, located at Cheverie, Walton, Wentworth, Newport Station, Cheticamp and Baddeck Bay produced and exported crude gypsum to the United States. Consignments of crude gypsum were made to Canadian plants from Cheticamp, Newport Station, and Mabou Harbour. Hard wall and selenite plasters were manufactured in Windsor, by the Windsor Plaster Company Limited, from Nova Scotia gypsum.

In New Brunswick crude gypsum was exported to the United States from deposits located at Hillsborough; shipments of calcined gypsum were also made to the United States, New Zealand, Australia, South Africa and Barbadoes, a considerable quantity of Hillsborough gypsum is used in the province in the manufacture of hard wall and finishing plasters together with allied gypsum products. Small shipments of land plaster were made to the United States from a quarry at Plaster Rock, New Brunswick; this was crushed for agricultural purposes.

Ontario's output of crude and calcined gypsum was produced at Caledonia, Lythmore and Hagersville. Gypsum, Lime and Alabastine, Canada, Ltd., operates plants at the two former places, also in Montreal, Winnipeg, Calgary, and New Westminster. This company manufactures an extensive line of building materials including plasters, cements, insulating materials and various other products made from gypsum. In October 1931 the Canadian Gypsum Company, a subsidiary of the United States Gypsum Company, commenced production of crude and calcined gypsum near Hagersville, Ontario. The same company also operates in Nova Scotia and New Brunswick and a wide variety of gypsum products is manufactured. The company started sinking operations and plant construction in Ontario in May; a four-foot gypsum bed at a depth of 90 feet is worked through a three compartment shaft.

In Manitoba crude gypsum produced at Gypsumville by Gypsum, Lime and Alabastine Canada, Limited, and at Amaranth by Western Gypsum Products, Limited was shipped to plants in Winnipeg for the manufacture of gypsum products, the market for these extends from Port Arthur to British Columbia.

Production at the Falkland deposits in the Kamloops mining division of British Columbia was continuous throughout the year. Gypsum from this property goes to New Westminster (Port Mann) for manufacture into various products. Gypsite was produced from deposits situated in the Kelly Lake area, Central District No. 3.

Table 208.—Capital Employed in the Gypsum Industry in Canada by Provinces, 1930 and 1931

	1930			1931		
	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:						
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated value if rented.)	3,451,596	3,908,559	7,360,155	2,010,954	4,133,663	6,144,617
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	369,679	291,939	661,618	60,566	352,358	412,924
(c) Inventory value of finished products on hand†.....				218,004	231,591	449,595
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	370,598	404,494	775,092	695,803	238,143	933,946
Total.....	4,191,873	4,604,992	8,796,865	2,985,327	4,955,755	7,941,082

†Included with item (b) in 1930.

Table 209.—Employees, Salaries and Wages in the Gypsum Industry in Canada, 1930 and 1931

	1930				1931			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	56	13	69	\$ 152,158	52	12	64	\$ 131,887
Wage-earners—								
Mine.....	457		457		383		383	
Mill.....	296		296		229		229	
Total.....	753		753	629,481	612		612	524,703
Grand total.....	809	13	822	781,639	664	12	676	656,590

Table 210.—Annual Production of Gypsum in Canada, by Provinces, 1922-1931

(For the years 1874 to 1921 see Mineral Production of Canada, 1928)

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1922..	332,404	\$ 580,148	82,462	517,668	110,227	621,668	34,072	440,914	100	\$ 500	559,265	2,160,898
1923..	341,705	747,934	104,740	564,680	99,958	542,317	31,575	388,554	323	1,615	578,301	2,243,100
1924..	441,752	915,845	86,738	476,804	88,121	467,097	29,375	348,212	30	150	646,016	2,208,108
1925..	551,230	1,070,408	71,745	408,917	82,020	491,833	35,088	417,868	240	865	740,323	2,389,891
1926..	678,107	1,187,918	59,546	468,411	89,987	496,059	35,172	461,461	20,918	156,964	883,728	2,770,813
1927..	829,438	1,512,015	85,293	524,550	83,998	500,688	39,895	512,008	24,493	201,754	1,063,117	3,251,015
1928..	1,013,257	1,850,243	75,033	501,252	85,811	553,271	51,285	609,039	20,982	229,843	1,246,368	3,743,648
1929..	948,895	1,152,160	70,482	485,982	100,347	832,689	67,269	631,051	24,696	243,814	1,211,689	3,345,696
1930..	827,063	982,287	82,674	513,677	94,946	776,060	34,157	298,297	32,128	248,458	1,070,968	2,818,788
1931..	707,817	878,487	58,957	451,264	53,358	374,469	23,076	231,124	20,544	176,173	863,752	2,111,517

Table 211.—Summary of Statistics on Gypsum in Canada, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
Crude gypsum mined.....	1,225,728	\$	1,110,048	\$	882,880	\$
Crude gypsum calcined.....	218,005		168,967		167,335	
PRODUCTION BY GRADES—						
†Crude—						
Lump.....	44,848	90,071	56,628	116,401	47,147	103,396
Crushed.....	964,875	1,147,289	845,210	973,623	693,764	791,910
Fine ground.....	2,201	17,271	8,160	38,894	4,418	21,392
(a) Calcined.....	199,765	2,091,065	160,970	1,689,870	118,423	1,194,819
Total.....	1,211,689	3,345,696	1,070,968	2,818,788	863,752	2,111,517
PRODUCTION BY PROVINCES—						
†Nova Scotia.....	948,895	1,152,160	827,063	982,287	707,817	878,487
New Brunswick.....	70,482	485,982	82,674	513,677	58,957	451,264
Ontario.....	100,347	832,689	94,946	776,069	53,358	374,469
Manitoba.....	67,269	631,051	34,157	298,297	23,076	231,124
British Columbia.....	24,696	243,814	32,128	248,458	20,544	176,173
Total.....	1,211,689	3,345,696	1,070,968	2,818,788	863,752	2,111,517
IMPORTS—						
Gypsum, crude (sulphate of lime)*.....	1,244	18,671	898	25,882	484	13,491
Plaster of Paris, or gypsum ground not calcined.....	165	5,283	219	5,352	158	4,476
Plaster of Paris, or gypsum calcined and prepared wall plaster.....	16,356	189,438	16,608	190,832	11,050	120,516
Total.....	17,765	213,392	17,725	222,066	11,692	138,483
EXPORTS—						
Gypsum or plaster crude.....	893,445	1,086,939	719,381	871,567	618,765	741,376
Plaster of Paris, ground and prepared wall plaster.....	7,938	137,046	7,282	119,092	3,085	50,774
Total.....	901,383	1,223,985	726,663	990,659	621,850	792,150

*Consists of crown filler and anhydrous sulphate of lime.

†Shipments of crude gypsum include some anhydrite produced in Nova Scotia.

(a) Does not include gypsum calcined in manufacturers' plants in Calgary and Montreal.

Table 212.—World Production of Gypsum, 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	967,491	838,208	754,895	Latvia (exports).....	26,629	36,077	32,014
Canada.....	1,081,865	956,221	771,207	Luxemburg.....	7,092	10,451	9,117
Union of South Africa.....	16,973	16,828	14,613	Roumania (b).....	75,414	50,442	52,166
Cyprus (exports).....	12,556	12,000	15,300	Spain (b).....	960,250	1,557,380	481,362
Palestine.....	1,475	1,635	483	Sweden.....	120	133	49
India.....	52,726	56,316	53,632	Algeria (including alabaster).....	105,300	164,100	83,569
Australia.....	124,515	51,085	26,167	Belgian Congo.....			1,000
Total.....	2,260,000	1,960,000	1,650,000	United States.....	4,478,689	3,099,458	2,284,837
FOREIGN COUNTRIES				Tunis.....	19,231	(a)	(a)
Austria (d).....	42,000	36,760	(a)	Argentina.....	36,051	48,667	38,849
Estonia.....	9,835	1,932	7,727	Chile.....	15,190	16,907	12,965
France.....	2,529,420	3,015,323	(a)	Peru.....	19,830	(a)	(a)
Germany (Bavaria).....	59,241	41,114	26,737	China.....	50,700	61,100	70,400
Prussia (alabaster).....	396	287	122	Cuba.....	25,000	26,800	(a)
Greece (b).....		2,730	6,400	Egypt (c).....	130,000	130,000	130,000
Italy (including alabaster).....	658,678	674,703	576,592	New Caledonia.....	7,004	3,082	(a)
Jugoslavia (Serbia only).....	1,585	1,440	(a)	Total.....	9,200,000 ^(e)	9,000,000 ^(e)	(a)
				Grand total.....	11,500,000^(e)	11,000,000^(e)	(a)

(a) Data not available.

(b) Converted from cubic metres at the rate of 1 cubic meter=2 long tons.

(c) Estimated.

(d) Estimated by Bundesministerium für Handel und Verkehr.

(e) Excluding the production of Russia.

IRON OXIDES (OCHRE)

In 1851, an important deposit of ochre was worked at Pointe du Lac, St. Maurice county, Quebec, and shipments of dried ochre were made to the United States, subsequently this property was abandoned. Thirty-two years later the manufacture of dry ochre was commenced on a small scale in Iberville township on the Little Romaine river. This deposit was later abandoned but in 1916 it was re-opened and a small quantity of crude ochre was taken out for use as a pigment in the paper industry. A deposit was opened up at St. Malo, Champlain county, in 1885 and a calcining plant erected. Calcined ochre was shipped from the mill to Montreal where it was further prepared for use in the manufacture of paint.

Deposits of iron oxides in the Three Rivers district, Quebec, are important. The Canada Paint Company Limited, operates a large plant at Red Mill for calcining, washing and grinding pigments.

About one and a half miles east of Red Mill, the Champlain Oxide Company operated a calcining plant. No shipments have been made from this plant since 1923.

For a number of years Thos. H. Argall operated a calcining plant near the Champlain mill. Operations ceased due to labour troubles and this producer opened up another deposit at Pointe du Lac from which crude oxides are shipped for use in the purifying of illuminating gas.

The Montmorency Paints Products Company have abandoned their deposit at Beauré, and have removed their plant to a new deposit at Les Forges, some seven miles north of Three Rivers. Operations are now being conducted at this new location.

Prior to 1911 small quantities of ochre were produced intermittently from a deposit at Campbellville, Halton county, Ontario. No production has been recorded in this province since that date.

In 1931 a small deposit of ochre (Bog ore) was made to Vancouver from a property near Mons, British Columbia.

Shipments from properties in 1931 were confined to the provinces of Quebec and British Columbia; the Quebec output is consumed largely by the pigment industry while that from the western province is used in the purification of artificial gas.

The Quebec Department of Mines recently investigated the ochre deposits at Little Romaine and Bergeronnes situated on the north shore of the St. Lawrence river. The Romaine ochre area measures 400 feet by 1,500 feet and one hundred and thirteen samples show an average depth of one foot and an average tenor of 86.88 per cent Fe_2O_3 , the ochre is of different colours and grades, yellow or brown at the surface and grey at depth. Forty drill holes on the Bergeronnes deposit established an average depth of fifteen inches and a mean tenor of 91.2 per cent Fe_2O_3 , the mineral in this deposit occurs as disconnected pockets.

Table 213.—Capital Employed in the Iron Oxides Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment.....	106,809	137,463
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	38,590	16,194
†(c) Inventory value of finished products on hand.....		2,644
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	5,305	25,234
Total.....	150,704	181,535

†Included with item (b) in 1930.

Table 214.—Employees, Salaries and Wages in the Iron Oxides Industry in Canada, 1930 and 1931

Class	1930		1931	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried employees.....	2	4,543	2	3,800
Wage-earners.....	41	36,695	28	25,394
Grand total.....	43	41,238	30	29,194

Table 215.—Production of Iron Oxides in Canada, 1922-1931

(For the Years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	7,285	110,608	1927.....	6,125	103,536
1923.....	10,424	129,636	1928.....	5,414	111,198
1924.....	7,266	91,160	1929.....	6,518	115,932
1925.....	7,118	91,913	1930.....	6,596	83,873
1926.....	6,626	101,843	1931.....	5,520	49,205

Table 216.—Production in Canada, Imports and Exports of Iron Oxides, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	6,518	115,932	6,596	83,873	5,520	49,205
IMPORTS—						
Ochres, ochrey earths, siennas, and umbers.....	3,495	121,698	2,413	75,596	1,666	57,825
Oxides, fire proofs, rough stuffs, fillers and colours, dry, n.o.p.....	3,683	790,654	3,392	697,331	3,170	639,863
EXPORTS—						
Mineral pigments, iron oxides and ochres...	1,113	42,554	417	32,798	742	50,951

MICA

Important deposits of mica in Canada are located in the counties of Hull and Labelle in Quebec, and Lanark, Leeds and Frontenac in Ontario. The product of these mines is chiefly shipped to Canadian mica trimming shops where it is either rough-cobbed or split and trimmed prior to export.

Mica production in Canada during 1931 amounted to 1,339 tons valued at \$54,066 as compared with 1,170 tons valued at \$96,004 in 1930. The total Canadian production in 1931 came from deposits in Quebec and Ontario. The decrease in value from the previous year was due largely to the marketing of lower priced grades of thumb-trimmed mica. There were also decreases in the price per pound of scrap and splittings.

Muscovite and phlogopite are two commercially important varieties of mica found in Canada. Muscovite occupies a minor position in mica production as compared with phlogopite. Important phlogopite deposits are located in the provinces of Ontario and Quebec. Quebec deposits occur principally in the areas of Hull and Papineau counties adjacent to the Lièvre and Gatineau rivers. In Ontario the more important occurrences are in Frontenac, Lanark and Leeds counties.

Sales of Canadian mica are generally made direct to the firms producing and grading the material. During recent years Canadian mica has encountered considerable competition from that of Madagascar, the only other commercially important phlogopite producer in the world.

While mica is used for a number of other purposes, its three principal uses are for electrical insulation, glazing and decoration. The most important of these at present is, however, as an insulator in the electrical industry. The specifications for high grade electrical commutator material are broadly as follows:—clear ruby, colourless or greenish; must split easily into smooth plates, one one-thousandth inch thick; must be free from cracks, holes, stains and spots, wrinkles, rulings or knots in any form; the film should be capable of withstanding 20,000 volts; magneto condensers require considerably lower electrical resistance. Mica sheets of greatly diversified shapes as washers, tubes, etc., are used extensively as an insulator in various electrical appliances. Canadian amber mica or phlogopite is considered to be one of the finest produced in the world for requirements in the electrical industry.

The invention of built up mica boards has brought the use of small sizes of mica within economic limits and for this purpose such material is converted into splittings.

Mica is now ground in the province of Quebec; the mills for the production of mica powder in the United States employ both wet and dry grinding. In wet grinding the scrap is passed through rolls, screened, and washed to remove clay, sand, and other foreign matter; the batch in the form of paste is ground by rotating wooden rollers, after final washing and drying the material is passed through a disintegrator and then bolted through silk cloth. The standard size of the finished product is between 140 and 150 mesh.

In the "dry grinding" a high speed pulverizer is used. The material is drawn out by a suction fan, passed through a cyclone collector and is finally screened to three grades between 20 and 100 mesh in wire cloth and trommels.

The future development of mica deposits depends to some degree upon the extent to which substitutes may enter into competition with existing uses for the mineral.

Table 217.—Capital Employed in the Mica Mining Industry in Canada, by Provinces, 1930 and 1931

	1930			1931		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:						
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment.... (estimated if rented)	165,866	66,723	232,589	19,352	66,722	86,074
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	35,672	124,502	160,174	35,502	61,739	97,241
†(c) Inventory value of finished products on hand.....					45,073	45,073
(d) Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	43,481	5,500	48,981	40,464	7,504	47,968
Total.....	245,019	196,725	441,744	95,318	181,038	276,356

†Included with item (b) in 1930.

Table 218.—Employees, Salaries and Wages in the Mica Mining Industry in Canada, 1930 and 1931

	1930		1931	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried employees.....	4	6,938	3	5,770
Wage-earners.....	240	56,378	25	16,786
Total.....	244	63,316	28	22,556

Table 219.—Production of Mica in Canada, by Provinces, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1922.....	1,360	97,748	1,989	54,515	3,349	152,263
1923.....	1,545	216,684	1,980	110,290	3,525	326,974
1924.....	1,677	185,020	2,414	172,252	4,091	357,272
1925.....	2,415	178,800	1,605	82,663	4,020	261,463
1926.....	1,664	170,118	881	59,086	2,545	229,204
1927.....	1,454	99,194	1,284	75,183	2,738	174,377
1928.....	1,101	54,224	2,559	32,944	3,660	87,168
1929.....	1,062	72,630	2,991	45,919	4,053	118,549
1930.....	430	61,729	740	34,275	1,170	96,004
1931.....	290	30,601	1,049	23,465	1,339	54,066

Table 220.—Production of Mica in Canada by Grades, 1930 and 1931

	1930			1931		
	Pounds	Value f. o. b. shipping point	Price per pound	Pounds	Value f. o. b. shipping point	Price per pound
		\$	\$		\$	\$
Rough cobbled.....	44,330	1,142	0-02	.....	.....	.....
Thumb-trimmed.....	8,096	8,281	1-02	49,835	5,717	0-11
Splittings only.....	77,530	35,601	0-46	37,475	14,398	0-38
Scrap.....	2,211,022	50,980	0-02	2,589,918	33,951	0-01
Total.....	2,340,978	96,004	0-04	2,677,228	54,066	0-02

Table 221.—Production in Canada, Imports and Exports of Mica, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	1,062	72,630	430	61,729	290	30,601
Ontario.....	2,991	45,919	740	34,275	1,049	23,465
Total.....	4,053	118,549	1,170	96,004	1,339	54,066
IMPORTS—						
Mica and manufactures of, n.o.p.....	.....	169,018	.....	102,775	.....	92,294
EXPORTS—						
Rough cobbled and thumb-trimmed.....	2	1,342	2	1,461	24	3,428
Splittings.....	91	96,726	39	35,351	19	14,672
Scrap and waste.....	4,789	112,905	1,039	48,436	1,232	32,600
Plate and manufactures (micanite).....	.....	2,086	.....	1,289	.....	797
Total.....	.....	213,959	.....	86,537	.....	51,497

Table 222.—World Production of Mica, 1929-1931

(Supplied by Imperial Institute)
(Long tons)

Country and Description	1929	1930	1931	Country and Description	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES			
Kenya.....	2			France.....	2	(a)	(a)
Northern Rhodesia.....	3	4	1	Norway (c)—			
Southern Rhodesia.....	169	162	66	Sheet.....		1	(a)
South West Africa (waste).....	31			Scrap.....	58	51	(a)
Tanganyika Territory.....	29	21	9	Sweden.....	65	72	64
Union of South Africa (b).....	1,525	878	843	Madagascar—			
Canada—				Muscovite.....	26	21	14
Rough cobbled.....		20		Phlogopite, etc.....	344	322	217
Thumb trimmed.....	43	4	22	United States (sales)—			
Splittings.....	10	34	17	Sheets (uncut).....	909	654	430
Scrap.....	3,566	987	1,156	Scrap (uncut).....	5,583	6,011	5,912
Ceylon (c).....	(12 cwt.)		2	Argentina.....	117	98	51
British India (c)—				Brazil.....	44	51	(a)
Sheet.....	890	741	414	Korea.....	22	28	(a)
Splittings.....	4,914	3,404	2,235	Guatemala.....	2	(a)	(a)
Australia.....	46	26	29	*South West Africa.....		250	100
Nigeria.....		(8 cwt.)	(17 cwt.)	*France.....	1,500	(a)	(a)
				*Germany.....	777	773	404
				*Portugal.....	740	269	564
				*Czechoslovakia.....		30	7

(a) Information not available.

(b) Nearly all scrap.

(c) Exports.

*Lithium mica.

SALT

The production of salt in the province of Ontario was first recorded in 1866 when a company was formed to drill for oil on the north bank of the Maitland river, and, while no success attended the efforts of the drillers in their search for oil, a bed of rock salt was found at a depth of 964 feet. In September, 1866, this company (incorporated under the name of the *Goderich Petroleum Company*, later changed to *Goderich Salt Company*) commenced pumping brine. In the initial working in connection with these deposits the refining was done by the kettle method, which was soon discarded and replaced by the pan method of evaporation. Wells were drilled and plants erected at Clinton and Seaforth, Ontario, and four refineries were in operation at Goderich in 1879; at the present time there are only two firms operating at Goderich.

Census reports show that there were 16 salt works in operation in Ontario and 2 in Nova Scotia during 1871. According to the 1881 census, 26 plants were in operation in Ontario and 1 each in Nova Scotia and New Brunswick.

Salt production in Canada during 1931 amounted to 259,047 short tons valued at \$1,904,149 as compared with 271,695 tons worth \$1,694,631 in 1930. Shipments in 1931, exclusive of the salt content of brine used in the manufacture of chemicals, averaged \$11.20 per ton as against \$10.05 per ton in 1930. Price advances contributing to the increase in valuation over the previous year were principally confined to table, dairy and common fine, grades.

It is becoming more apparent each year that the salt resources of Canada, especially those of Nova Scotia and New Brunswick, are very large. At Malagash, in Nova Scotia, about 300 feet of salt strata have been explored for approximately 1,000 feet along the strike and about 350 feet down the dip; two wells at Gautreau, New Brunswick, have penetrated several hundred feet of salt and recently a well drilled by the International Petroleum Company near Nappan, Nova Scotia, passed through several hundred feet of salt. Ontario, at the present time, is the most important salt producing province in the Dominion. Salt obtained in this province is recovered by evaporation of brine leached out of rock salt from beds that occur in the Salina formation in the southwestern part of the province.

Beds of rock salt have not, as yet, been discovered in Manitoba, but many brine springs are known and from these, in past years, salt has been recovered by evaporation. In Saskatchewan only one deposit of rock salt has been identified. This was encountered in a drill hole near Unity at a depth of 3,110 feet; salt was produced for a short time from natural brines at Senlac Lake and in 1931 salt brine was encountered in a drill hole of the Simpson Oil Company at Simpson, Saskatchewan. The brine contained 23 per cent salt and the company reports that it intends to construct a plant for the production of salt in commercial quantities. The Alberta government has proved the existence of an extensive bed of rock salt in the McMurray district by drilling.

Numerous brine springs are known to exist in the McKenzie River district. Saline springs occur in British Columbia near Prince Rupert, on Vancouver Island, in the Chilcotin Valley and in the district northwest of Ashcroft. There is at present no commercial salt production in Western Canada.

Canadian salt producing companies now manufacture a wide variety of high grade products suitable for almost every domestic and industrial requirement in both the Dominion and foreign countries.

Table 223.—Capital Employed in the Salt Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	3,975,855	3,392,506
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	284,887	181,065
†(c) Inventory value of finished products on hand.....		89,549
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	424,807	533,807
Total.....	4,685,549	4,196,927

†Included with item (b) in 1930.

Table 224.—Employees, Salaries and Wages in the Salt Industry in Canada, 1930 and 1931

	1930				1931			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
Salaried employees.....	42	10	52	\$ 107,637	41	16	57	\$ 112,479
Wage-earners.....	290	39	329	347,902	306		306	334,505
Total.....	332	49	381	455,539	347	16	363	446,984

Table 225.—Production of Salt in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	181,794	1,628,323	1927.....	268,672	1,614,667
1923.....	202,397	1,713,516	1928.....	299,445	1,495,971
1924.....	207,979	1,374,780	1929.....	330,264	1,578,086
1925.....	233,746	1,410,697	1930.....	271,695	1,694,631
1926.....	262,547	1,480,149	1931.....	259,047	1,904,149

Table 226.—Production of Salt in Canada, by Grades, 1930-1931

Grade	1930			1931		
	Manu- factured	Sold	Value of salt sold (not including containers)	Manu- factured	Sold	Value of salt sold (not including containers)
	tons	tons	\$	tons	tons	\$
Table, dairy and pressed blocks.....	56,574	57,122	948,248	57,250	57,294	1,136,378
Common fine.....	54,212	55,375	302,526	55,510	57,886	339,459
Common coarse.....	44,635	44,149	326,326	44,295	45,326	326,970
Land salt.....	281	281	1,414	542	527	1,861
Other grades.....	33	33	173	56	56	259
Brine for chemical works (salt equivalent sold or used).....	114,737	114,737	115,944	97,958	97,958	99,222
Total.....	270,472	271,695	1,694,631	255,611	259,047	1,904,149
Value of containers.....			499,740			491,357
Grand Total.....	270,472	271,695	2,194,371	255,611	259,047	2,395,506

Table 227.—Production in Canada, Imports, Exports and Consumption of Salt, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	330,264	1,578,086	271,695	1,694,631	259,047	1,904,149
IMPORTS—						
Salt, for the use of the sea or gulf fisheries	82,530	370,211	56,133	195,760	56,166	248,155
Salt, in bulk, n.o.p.....	54,997	208,130	40,910	169,948	40,323	177,738
Salt, n.o.p., in bags, barrels, etc.....	38,794	342,302	31,273	273,448	34,112	309,203
Salt, table, made by an admixture of other ingredients, when containing not less than 90 per cent of pure salt.....	245	16,177	69	21,747	294	16,842
Total	176,566	936,820	128,385	669,903	130,895	751,938
EXPORTS.....	9,359	70,762	8,758	74,397	6,126	55,110
APPARENT CONSUMPTION OF SALT.....	497,471	2,444,144	391,322	2,281,137	383,816	2,600,977

Table 228.—World Production of Salt, 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	1,974,170	2,067,564	1,897,564	Roumania.....	316,422	302,084	250,784
Malta.....	1,080	1,200	1,170	Russia.....	2,822,700	3,154,300	2,804,200
Mauritius (estimated)†.....	1,500	1,500	1,500	Spain.....	1,062,427	1,021,111	875,263
Nigeria (estimated).....	400	400	400	Switzerland.....	85,110	79,554	83,674
Somaliland (exports)†.....	3,100	1,032	(a)	Algeria.....	15,063	57,520	35,590
South-West Africa Territory.....	334	503	1,076	Ecuador.....	17,171	24,171	12,929
Anglo-Egyptian Sudan.....	14,715	14,082	(a)	Belgian Congo (estimated).....	80	80	80
Tanganyika Territory.....	7,270	6,559	6,617	Panama (estimated).....	50,000	50,000	50,000
Uganda.....	2,244	1,751	1,878	Egypt (exports).....	146,669	152,406	101,248
Union of South Africa (years ended June 30).....	87,453	87,928	(a)	Abyssinia (estimated).....	10,000	(a)	(a)
Canada (shipments).....	294,789	241,493	228,224	French Morocco.....	8,000	8,000	8,000
Br. West Indies (exports)†.....				French Somaliland.....	38,356	25,000	(a)
Bahamas.....	786	3,143	12,250	French West Africa (Mauritania).....	4,000	2,200	(a)
Grenada.....	69	153	129	Tripoli (estimated).....	20,000	20,000	20,000
Leeward Islands.....	1,289	1,517	2,316	Tunis.....	118,300	118,400	(a)
Turks and Caicos Islands.....	61,153	41,541	26,929	Netherlands West Indies (exports).....	4,603	4,744	(a)
Ceylon.....	25,080	9,533	(a)	Mexico (estimated).....	66,000	66,000	66,000
Cyprus (estimated).....	3,000	3,000	3,000	United States.....	7,628,179	7,191,465	6,569,705
India (including Aden).....	1,709,100	1,711,348	1,839,000	Argentina.....	194,675	142,309	156,855
Palestine.....	7,618	7,379	1,239	Chile.....	36,831	38,997	(a)
Australia.....	134,457	116,766	122,604	Colombia (estimated).....	29,000	29,000	29,000
Total	4,300,000	4,300,000	4,300,000	Peru.....	30,000	30,000	(a)
FOREIGN COUNTRIES				Venezuela (estimated).....	25,041	20,395	(a)
Korea.....	136,000	134,000	136,000	China including Kwantung Peninsula.....	2,408,019	2,562,500	2,235,000
Italian East Africa.....	100,000	100,000	100,000	Netherlands East Indies.....	506,450	339,412	(a)
Angola (estimated).....	10,000	10,000	10,000	Formosa.....	161,761	160,639	195,905
Austria.....	175,663	155,132	120,675	French Indo-China.....	251,100	(a)	(a)
Bulgaria.....	28,195	1,677	(a)	Japan (c).....	633,977	618,753	(a)
Czechoslovakia.....	163,733	174,886	187,175	Portuguese India (estimated).....	12,000	12,000	12,000
France.....	2,155,177	1,967,150	1,381,279	Siam.....	174,273	178,144	193,298
Germany.....	2,994,461	2,910,163	2,537,146	Turkey (Anatolia) (estimated).....	100,000	100,000	100,000
Greece (d).....	100,000	100,000	100,000	Philippine Islands.....	46,136	39,931	41,898
Italy.....	896,070	836,336	1,068,108	Canary Islands.....	2,000	2,000	2,000
Jugoslavia.....	43,900	53,733	51,850	Cape Verde Islands.....	10,324	12,200	10,900
Netherlands (c).....	44,205	49,020	55,254	Total	25,000,000	24,000,000	23,000,000
Poland.....	560,494	525,833	552,000	Grand total	29,000,000	28,000,000	27,000,000
Portugal.....	28		24				

(a) Data not available.

(c) Excluding production from salt beds, which, although on government beach lands, have no fixed areas. Figures refer to years ended March 31.

(d) Estimated on previous years figures.

† Sea salt.

TALC AND SOAPSTONE

Shipments of talc and soapstone ranging from 50 tons to 1,420 tons were made from Canadian deposits during the period 1886 to 1906. Prior to 1900 the production consisted mainly of impure talc and soapstone shipped from Quebec. It was not until 1900 that mining operations were commenced on the high grade talc deposits of the Madoc district. Ground talc was shipped from this district in 1906. Production advanced during the ensuing years until 1920 the high mark for the industry was reached, namely 21,671 tons valued at \$166,934, an average of \$7.70 per ton.

The production of talc and soapstone in Canada during 1931 was valued at \$157,083 as compared with an output valued at \$186,216 in 1930.

Soapstone produced in Quebec was shipped in the form of blocks and powder; in Ontario a high grade talc was mined and ground near Madoc. Shipments from the latter province were made to Europe, United States and points in Canada. Some crude talc was produced during 1931 at Leechtown, Victoria mining division, British Columbia.

The physical characteristics of talc largely determine its usefulness. The mineral is now being used in paper making, toilet preparations, paints, cements, rubber, textiles, lubricants, ceramics, insulators and in various other products and industrial processes; off colour talc is consumed in increasing amounts for rock dusting coal mines.

Table 229.—Capital Employed in the Talc and Soapstone Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	567,135	561,411
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	16,536	13,575
†(c) Inventory value of finished products on hand.....		4,050
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	30,713	39,554
Total.....	614,384	618,590

† Included with item (b) in 1930.

Table 230.—Employees, Salaries and Wages in the Talc and Soapstone Industry in Canada, 1930 and 1931

	1930				1931			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
				\$				\$
Salaried employees.....	3	2	5	10,610	5	2	7	23,275
Wage-earners.....	136		136	68,862	63		63	48,512
Total.....	139	2	141	79,472	68	2	70	71,787

Table 231.—Production of Talc and Soapstone in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Value	Year	Value
	\$		\$
1922.....	188,458	1927.....	236,105
1923.....	150,507	1928.....	219,358
1924.....	154,480	1929.....	229,198
1925.....	205,835	1930.....	186,216
1926.....	217,195	1931.....	157,083

Table 232.—Production in Canada, Imports and Exports of Talc and Soapstone, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Soapstone.....		47,986		50,168		34,439
Talc.....	15,509	181,212	11,841	136,048	11,836	122,644
Total.....		229,198		186,216		157,083
IMPORTS—						
Talc or soapstone, ground or unground...	5,516	109,675	4,799	85,779	2,670	49,452
EXPORTS—						
Talc.....	11,399	139,096	8,512	98,855	7,852	83,765

Table 233.—World Production of Talc, 1929-1931

(Supplied by Imperial Institute)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	29	185	160	Italy.....	40,126	37,491	37,800
Union of South Africa.....	435	349	210	Norway (exports).....	8,200	7,569	4,062
Canada shipments (b).....	13,847	10,572	10,568	Roumania (c).....	1,060	3,300	3,020
India.....	7,217	6,857	5,135	Spain.....	8,689	3,621	4,488
Australia.....	1,333	681	846	Sweden.....	6,915	5,036	5,351
Total.....	22,181	18,644	16,919	Morocco (French zone) (ex-ports).....	600	552	34
FOREIGN COUNTRIES				United States (d).....	196,235	160,165	146,207
Austria (exports).....	25,000	25,000	25,000	Uruguay (exports).....	928	1,440	1,761
Finland.....	2,803	2,803	(a)	Manchuria.....	40,000	26,000	22,000
France.....	103,890	(a)	(a)	Total.....	335,000	239,000	254,000
Germany (Bavaria).....	6,698	5,702	4,142	Grand total.....	358,000	258,000	271,000
Greece.....	148	252	476				

(a) Data not available.

(b) Excluding soapstone, which is only recorded by value and was as follows:—1929, £9,807; 1930, £10,232; 1931, £7,300.

(c) Converted from cubic metres at rate of 1 cu. metre = 2 long tons.

(d) Excluding steatite, figures for which are not available for publication.

MISCELLANEOUS NON-METAL MINING INDUSTRIES

Included in this chapter are the following non-metallic minerals:

Actinolite	Manganese, bog
Barytes	Mineral waters
Bituminous sands	Natro-alunite
Fluorspar	Phosphate
Graphite	Pyrites
Lithium minerals	Silica brick
Magnesite	Sodium carbonate
Magnesium sulphate	Sodium sulphate

Statistics relating to capital and labour are combined for these industries and are shown in Tables 234 and 235.

In addition to the foregoing, data are also shown for production, imports and exports of sulphuric acid and sulphur.

Table 234.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1930 and 1931

	1930	1931
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	3,180,465	4,964,737
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	349,109	108,324
(c) Inventory value of finished products on hand.....		211,817
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	79,322	173,052
Total.....	3,608,896	5,457,930

†Included with them item (b) in 1930.

Table 235.—Employees, Salaries and Wages in the Miscellaneous Non-Metal Mining Industries, 1930 and 1931

—	1930				1931			
	Number of employees			Salaries and wages	Number of employees			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	48	9	57	84,598	37	4	41	68,947
Wage-earners.....	440	1	441	442,585	234		234	228,447
Total.....	488	10	498	527,183	271	4	275	297,394

ACTINOLITE

Actinolite, which is a calcium-magnesium-iron silicate, is used in the manufacture of coal-tar roofing compounds. Mining of this mineral in Canada commenced in 1883. Canadian deposits from which production has been derived are located in Elzevir and Kaladar townships, Hastings county, Ontario; Actinolite, Ontario is the centre of this industry. In 1902 and 1903 production was at its peak and 550 tons were shipped; however, during the following six years, no operations were carried on. Shipments recommenced in 1910 and have continued up to the present. Annual production of ground actinolite during the past 9 years has ranged between 30 tons and 100 tons. In 1931, shipments to the United States from Canadian deposits amounted to 35 tons valued at \$456. The mineral was crushed and pulverized and after mixing with mica was exported to the United States. Actinolite, often with mica, is used in the manufacture of coal tar roofing compounds.

Table 236.—Production of Actinolite in Canada, 1922-1931

(For production from 1897 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	50	575	1927.....	86	1,075
1923.....	53	583	1928.....	70	875
1924.....	90	1,225	1929.....	30	375
1925.....	40	500	1930.....	34	437
1926.....	80	1,000	1931.....	35	456

BARYTES

Deposits of barytes at Five Islands, Colchester county, and Brookfield, Hants county, Nova Scotia, were first operated between 1865 and 1870. These deposits have produced about 5,000 tons of barytes. The McKellar Island deposit in Thunder Bay district, Ontario, in the course of its operations produced several thousand tons of this mineral. Work ceased on this property in 1894.

Large deposits of barytes at Lake Ainslie, Cape Breton Island, were opened up in 1894 and operations in this district have been practically continuous since that date. Between 1900 and 1903 the Cap Rouge deposit in North Cheticamp district was operated.

In 1918 a deposit in Langmuir township, Ontario, was active and a mill for grinding and preparing barytes was completed during that year. A shipment of 60 tons was made. Development work was done on the Bellew mine in North Burgess township in 1918. A deposit near Tionaga station was operated in 1923 and 200 tons of barytes were shipped.

Barytes shipments from Canadian deposits during 1931 totalled 16 tons valued at \$363. This production came entirely from the Lake Ainslie mine situated in Inverness county, Nova Scotia. The use of barytes, especially in the United States, for the manufacture of lithopone, has increased very rapidly during recent years. Crude barytes used in the manufacture of barium products in the United States during 1930 was as follows: 69,426 tons as ground barytes, 178,944 tons in the manufacture of lithopone, and 76,825 tons for barium chemicals. During 1931 the Bellew barytes mine was operated for a limited period; this property is located in Lanark county, Ontario.

Table 237.—Production of Barytes in Canada, 1922-1931

(For the years 1885 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	289	9,537	1927.....	56	1,268
1923.....	409	8,548	1928.....	127	2,847
1924.....	151	3,308	1929.....	105	2,341
1925.....	95	2,259	1930.....	66	1,484
1926.....	100	2,307	1931.....	16	363

Table 238.—Imports of Barytes and Barium Products into Canada, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Barium, peroxide of, non-alcoholic.....	14	2,216	3	1,141	3	624
Blanc fixe.....	946	52,473	1,055	52,591	798	34,483
Barytes.....	2,646	52,078	1,949	35,945	1,686	32,712
Lithopone.....	9,704	852,079	8,025	722,341	6,931	560,037
Satin white.....	1,252	38,135	829	19,579	576	13,819

BITUMINOUS SANDS

Shipments of bituminous sands from the Fort McMurray district, Alberta, amounted in 1931 to 1,015 tons valued at \$4,060 as compared with 2,067 tons worth \$8,268 in 1930. In 1931 the International Bitumen Company Limited carried on development work in the McMurray district.

Preliminary to commencement of operations on a commercial basis, the Scientific and Industrial Research Council of Alberta has conducted important investigations on these sands in an endeavour to find an economic method for the extraction of bitumen. During 1930 and part of 1931 the Mines Branch, Ottawa, conducted experimental hydrogenation and pressure-cracking experiments on Alberta bitumen at the Fuel Research Laboratories. The Department states that on the assumption that bitumen is more amenable to hydrogenation than coal, and that the difference in price between bitumen and coal is not too great, there is a possibility that gasoline can be produced from Alberta bitumen at a price lower than 14 cents per gallon. Such a prediction, however, is subject to confirmation by large scale tests and by a complete study of the economics of the situation.

These deposits of bituminous sands are stated to rank among the largest of their kind in the world.

Table 239.—Production of Bituminous Sands in Canada and Imports of Asphalt, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Bituminous sands.....	989	3,956	2,067	8,268	1,015	4,060
IMPORTS—						
Asphalt, solid.....	53,760	329,328	42,791	650,837	36,900	517,532
Asphalt, not solid.....		99,704		98,458		35,854
Asphaltum oil for paving purposes.....		23,448		70,130		45,557
Total.....		952,480		819,425		598,943

FLUORSPAR

The first recorded shipment of fluorspar from a Canadian deposit was made in 1905 when 12 tons were shipped from a mine in Madoc township, Ontario. Five years later about 200 tons were mined in Huntingdon township, Ontario, of which quantity 2 tons were shipped. In 1911, the metallurgical works at Deloro and the steel foundries at Welland received small shipments. During 1916, Ontario companies shipped 1,284 tons of fluorspar and increasing tonnages were produced during 1917 and 1918. In the latter year British Columbia became a producer of this mineral when the Rock Candy mine of the Consolidated Mining and Smelting Company near Grand Forks commenced operations. This mine was idle during 1931.

Production of fluorspar in Canada during 1931 totalled 40 tons valued at \$620 as against 80 tons worth \$1,240 in the previous year. This output came entirely from deposits of the mineral occurring in Hastings county, Ontario.

In 1931 fluorspar mines in the United States shipped 39,832 tons to steel plants, 1,123 tons to foundries, 5,279 tons to glass works, 1,996 tons for enamel and vitrolite, 4,386 tons for the manufacture of hydrofluoric acid and derivatives, and 557 tons for miscellaneous purposes.

Imports of fluorspar into Canada during 1931 totalled 3,215 tons valued at \$31,257 as compared with 12,651 tons worth \$160,995 in 1930. Hydrofluosilic acid imports in 1931 amounted to 12 tons valued at \$3,264 as against 5 tons valued at \$1,353 during the previous year.

Table 240.—Production of Fluorspar in Canada, by Provinces, 1922-1931

(For the years 1905 to 1921 see Mineral Production of Canada, 1928)

	Ontario		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1922.....	284	3,905	4,219	98,233	4,503	102,138
1923.....	64	597	75	1,135	139	1,732
1924.....	76	1,343			76	1,343
1925.....	12	200	3,874	19,034	3,886	19,234
1926-1928.....						
1929.....	70	1,120	17,800	267,000	17,870	268,420
1930.....	80	1,240			80	1,240
1931.....	40	620			40	620

GRAPHITE

The first operations in the graphite industry in Canada were carried on in the province of Quebec in 1846, when a deposit of crystalline graphite was worked in Grenville township. During 1869 an estimated value of \$72,000 was placed on shipments of graphite from New Brunswick and Quebec. Ten years later exports from Canada were valued at \$1,167. During the three-year period 1869-1871, a property in Buckingham township, Quebec was operated with an average production of 450 tons; employment was furnished 18 men during this period. From 1888 to 1899, operations were carried on intermittently in Buckingham township, however, from that date to 1906 little work was done on these deposits. In 1916, mills at Buckingham and St. Remi d'Amherst, shipped 479 tons.

Mining and milling of graphite in Ontario had its inception in 1870 when the Port Elmsley deposit was opened up and the Oliver's Ferry refining plant was constructed. A deposit in Bedford township was operated prior to 1890 and a small quantity of crystalline graphite was produced. In 1896 another producer commenced operations, namely, the Black Donald Company. This company's deposit is located near Calabogie in Renfrew county and is the largest and richest body of graphite known in North America. Operations have been practically continuous since the opening up of this property. The graphite is shipped as refined product, the higher grades which are used in lubricating compounds, being 90 to 99 per cent pure. Graphite is used principally in lubricants, foundry facings, stove polishes, crucibles, electric furnaces, and in the manufacture of paints for iron and steel structural work.

Graphite production in 1931 came entirely from the province of Ontario, the total sales for the year amounted to 548 tons valued at \$32,149 as against 1,535 tons appraised at \$96,392 in 1930. The general world industrial depression with a declining demand for graphite and resultant lower prices have seriously affected mining operations in most of the graphite producing countries. Canada produces both flake and amorphous graphite.

The increased use of carborundum, the product of the electric furnace, is having a decided influence on the demand for graphite.

Table 241.—Production of Graphite in Canada, by Provinces, 1922-1931

(For production from 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1922.....	24	1,500	573	29,853	597	31,353
1923.....	45	2,316	1,068	65,557	1,113	67,873
1924.....	46	3,275	1,288	72,842	1,334	76,117
1925.....	359	30,900	2,210	127,863	2,569	158,763
1926.....	326	29,516	2,401	165,344	2,727	194,860
1927.....	34	2,043	1,795	109,613	1,829	111,656
1928.....	50	4,668	1,047	52,373	1,097	57,041
1929.....	173	12,652	1,288	90,522	1,461	103,174
1930.....	197	9,850	1,338	86,542	1,535	96,392
1931.....			548	32,149	548	32,149

Table 242.—Production in Canada, Imports and Exports of Graphite, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore milled.....	5,448		6,037		924	
Production.....	1,461	103,174	1,535	96,392	548	32,149
IMPORTS—						
Crucibles, plumbago.....		66,833		52,458		34,215
Plumbago, not ground or otherwise manufactured.....		6,546		2,032		1,404
Plumbago, ground and manufactures of n.o.p.....		82,391		61,742		81,233
EXPORTS—						
Graphite or plumbago, crude or refined..	1,582	88,647	2,418	127,291	951	44,606

Table 243.—World Production of Graphite, 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Canada (sales).....	1,304	1,371	489	Germany.....	21,012	24,602	23,199
Australia.....	50		60	Italy.....	7,352	5,787	3,986
Ceylon (exports).....	12,739	8,724	6,721	Russia (years ended Sept.30)	4,500	(a)	(a)
Union of South Africa.....	52	206	43	Japan.....	303	226	290
India.....	39		7	Korea.....	24,359	19,672	14,500
				Madagascar.....	14,600	9,700	4,613
Total.....	14,200	10,300	7,300	Morocco (French zone).....	44	1,800	(a)
				Mexico.....	5,630	5,760	3,073
FOREIGN COUNTRIES				United States (sales).....	5,766	1,733	(a)
Austria.....	24,897	17,400	11,869	Norway.....			868
Brazil.....	15	10	(a)				
Czechoslovakia.....	23,277	14,330	1,801	Total.....	134,000	108,000	75,000
France.....	694	226	(a)	Grand total...	148,000	118,000	82,000

(a) Information not available.

LITHIUM MINERALS

CANADA

In a statement prepared by J. F. Wright, *Federal Department of Mines*, Ottawa, Canada, on the subject of lithium minerals, there are the following remarks:—

An outcrop of massive lepidolite was discovered in July, 1924, about one mile south of the Winnipeg river, some 10 miles east and a little north of Pointe du Bois. The Manitoba lithium deposits are the only ones of possible commercial value known within the British Empire.

At the Silver Leaf Mining Syndicate deposit, the lithium minerals occur in pockets and lenses in the central portion of a body of pegmatite which is exposed for 125 feet in a general east-west direction and across an average width of 80 feet. An analysis of a hand-picked sample, judged to represent approximately the lithium-bearing rock after the gangue has been removed, gave 4.76 per cent lithia (Li₂O). There is estimated to be between 2,500 and 3,000 tons of this type of ore for each 10 feet in depth within a horizontal area equal to that at the surface. Two lens-shaped bodies of lepidolite, or a lithia mica of like character, estimated to contain about 540 tons of lithia ore for each 10 feet in depth and averaging 3.87 per cent lithia, occur near the south side of the pegmatite mass. This lithia mica contains only one-tenth of one per cent iron (Fe₂O₃), and therefore probably will be found satisfactory for the manufacture of opal, white and flint glass.

Active development commenced in 1925, camps being put up, and a compressor, drills, and gasoline engines installed. Three miles of pole tram-line and winter road were built to a point on the Winnipeg river a short distance below Lamprey Falls. A considerable tonnage of ore has been blasted out and some small shipments made to England, Germany and the United States. Transportation is not difficult as barges may be floated down the river to the railhead, Pointe du Bois.

Lithium minerals are used both in their natural state and as sources of salts and compounds. Lithium chloride, finds a large use in the manufacture of fireworks and signal lights. An exceptionally hard alloy has been developed in Germany composed of aluminium and a small percentage of lithium. An American alloy of extreme lightness contains lithium and beryllium.

MAGNESITE

A Magnesite-dolomite deposit of economic importance was discovered in Grenville township, Quebec, in 1900 but it was not until 1907 that these deposits were worked. There were 120 tons shipped in 1908 for use in the manufacture of carbonic acid gas and floor cement.

The cutting off of the Austrian supply of magnesite during the World War stimulated investigations of the Grenville deposits as a source of magnesite for the manufacture of refractory brick and furnace lining.

Shipments of calcined and clinkered material made from this rock totalled 11,411 tons valued at \$295,579 in 1931 as compared with 13,336 tons worth \$336,162 in 1930. Quebec is the only Canadian province producing refractory material of this nature, the output coming from Harrington and Grenville townships along the north shore of the Ottawa river, some sixty miles west of Montreal; the deposits are stated to occur as replacements in ancient crystalline limestones of the Grenville series. Deposits of hydro-magnesite occur near the town of Atlin, British Columbia.

The Mines Branch and National Research Council in Ottawa have co-operated in carrying out exhaustive and successful research on the utilization of Canadian magnesite in the manufacture of high temperature firebrick.

Table 244.—Production of Magnesite* in Canada, 1922-1931

(For the years 1908 to 1921 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	2,849	76,294	1927.....	7,337	230,309
1923.....	4,801	134,382	1928.....	13,195	346,990
1924.....	3,873	101,356	1929.....	18,809	491,170
1925.....	5,576	122,325	1930.....	13,336	336,162
1926.....	4,571	137,431	1931.....	11,411	295,579

*Dolomite high in magnesium.

Table 245.—Production in Canada, Imports and Exports of Magnesite, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude, mined.....	43,229		27,638		26,839	
Crude, calcined or treated.....	39,514		28,128		22,544	
PRODUCTION—Calcined and dead-burned.....	18,809	491,170	13,336	336,162	11,411	295,579
IMPORTS—						
Magnesia pipe covering.....		259,080		297,513		126,210
†Magnesite.....	125	4,423	89	3,629		
Magnesite firebrick.....		256,635		270,180		152,435
*Magnesite, dead burned, sintered caustic, calcined or plastic magnesia.....			1,182	21,799	1,787	40,628
EXPORTS—						
Magnesite, calcined or dead-burned.....	5,279	125,613	1,851	48,536	1,610	45,257

†January 1 to March 31, 1930; also in addition 260 tons of crude magnesite rock valued at \$5,187 were imported from April 1 to December 31, 1930.

*April 1 to December 31, 1930.

Table 246.—World Production of Magnesite, 1929-1931

(Supplied by Imperial Institute)

(Long tons)

Country and description	1929	1930	1931	Country and description	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Union of South Africa—				Italy—			
Crude magnesite.....	1,682	1,879	1,336	Crude magnesite.....	16,901	4,057	(a)
Canada—				Jugoslavia (Serbia only)—			
Crude magnesite (mined).....	38,597	24,677	23,963	Crude magnesite.....	6,511	17,701	22,700
Caustic magnesite.....	16,794	11,907	10,188	Calcined magnesite.....	(a)	6,585	8,436
India—				Norway—			
Crude magnesite.....	23,497	16,523	5,333	Crude.....	1,781	2,171	1,555
Australia—				Calcined magnesite.....	488	783	450
Crude magnesite.....	9,115	8,754	(d) 3,425	Magnesia bricks.....	524	326	290
FOREIGN COUNTRIES				Russia—(years ended Sept. 30)—			
Austria—				Crude magnesite.....	130,614	150,000	242,000
Crude magnesite.....	430,000	299,588	176,606	Caustic magnesie (c).....	5,780	6,129	13,665
Caustic magnesie (c).....	(a)	20,200	34,211	Dead-burnt magnesie (c).....	53,403	62,566	51,700
Dead-burnt magnesie (c).....	88,400	122,264	38,186	Magnesia bricks (c).....	28,857	33,906	29,904
Bricks (c).....	45,000	40,434	23,411	United States—			
Czechoslovakia—				Crude magnesite.....	167,554	115,464	65,716
Crude magnesite (b).....	158,000	116,000	(a)	Caustic (sales) (c).....	10,170	7,661	5,268
Calcined magnesite (b)....	42,616	30,123	14,569	Dead-burned (sales) (c).....	70,268	44,161	25,206
Greece—				Turkey—			
Crude magnesite.....	82,696	67,427	49,200	Crude magnesite.....	281	317	2,162
Caustic magnesie (c).....	32,087	19,661	12,764	China—			
Dead-burnt magnesie (c).....	1,229	889	1,886	Crude magnesite.....	31,681	29,016	30,000

(a) Data not available.

(b) Exports less imports.

(c) Derived from crude shown and not additional.

(d) Excluding production of Victoria which is not available. During 1930 this amounted to 63 long tons.

MAGNESIUM SULPHATE

In 1915 work commenced on the Spotted Lake deposit of magnesium sulphate, near Kruger mountain, Osoyoos division, British Columbia. Shipments were made of this material to the drug trade during 1915 and 1916. Crude magnesium sulphate to a total of 2,600 tons was extracted in 1917 of which quantity 929 tons were shipped to Oroville, Washington. The following year a deposit near Clinton, Lillooet district, was also operated. Preliminary shipments were made in 1920 from several lakes, containing these salts, on the Basque ranch, near Ashcroft, British Columbia.

No activities have been reported in this industry since 1923. In that year 121 tons of refined magnesium sulphate were shipped from a deposit near Ashcroft, British Columbia. Imports of magnesium sulphate or epsom salts during 1931 reached a total of 2,060 tons valued at \$43,807; in the previous year 2,566 tons worth \$52,718 were brought into Canada.

For annual productions from 1917 to 1923 see Mineral Production of Canada annual report for 1930.

MANGANESE BOG

Bog manganese, usually an impure earthy mixture of manganese and other metallic oxides, occurs at Dawson Settlement, near Hillsborough, New Brunswick. Shipments from this deposit during 1931 amounted to 77 tons valued at \$462 and constituted the total Canadian production of this material for the year. Bog manganese is utilized largely in the ceramic industry.

MINERAL WATERS

A record of all the natural mineral waters produced in Canada and sold to the general public for medicinal purposes since 1888 has been compiled. In that year 124,850 gallons were produced and during the following ten years production varied between 424,600 gallons and 767,460 gallons. Only the value of shipments were recorded from 1899 to 1920; the high mark for the industry was reached in 1911 when the production was valued at \$223,758.

Production of natural mineral waters in Canada during 1931 amounted to 217,408 imperial gallons valued at \$13,324 as compared with 227,141 gallons worth \$24,481 in 1930. Of the 1931 production Quebec contributed 19,868 gallons and Ontario 197,540 gallons. Numerous Canadian spring waters are reported to possess distinct therapeutic qualities and have been employed for medicinal purposes in several of the provinces. Total imports of mineral and aerated waters, n.o.p., during 1931 amounted in value to \$154,971 as against \$195,257 in the previous year.

Table 247.—Production of Mineral Waters in Canada, 1922-1931

(For the years 1888 to 1921 see the Mineral Production of Canada, 1928)

Year	Imp. gal.	Value	Year	Imp. gal.	Value
		\$			\$
1922.....	221,433	14,220	1927.....	303,530	14,624
1923.....	232,451	16,455	1928.....	269,045	33,498
1924.....	209,353	15,421	1929.....	321,905	16,139
1925.....	190,134	28,413	1930.....	227,141	24,481
1926.....	215,356	29,721	1931.....	217,408	13,324

Table 248.—Production in Canada, Imports and Exports of Mineral Waters, 1929-1931

	1929		1930		1931	
	Imp. gal.	Value	Imp. gal.	Value	Imp. gal.	Value
		\$		\$		\$
PRODUCTION, by provinces—						
Quebec.....	12,205	2,488	12,941	3,727	19,868	4,746
Ontario.....	309,700	13,651	214,200	20,754	197,540	8,578
Total.....	321,905	16,139	227,141	24,481	217,408	13,324
IMPORTS—Mineral and aerated waters.....		253,940		195,257		154,971
EXPORTS—Mineral and aerated waters.....		12,320		10,017		13,411

PHOSPHATE

The existence of the extensive Lièvre river deposits of crystalline phosphate lime or apatite was first noted in 1829. However, the first commercial shipments of this mineral in Canada were made between 1870 and 1877 from North Burgess township, Ontario to a superphosphate plant at Brockville. An active market was open in Europe for raw phosphate for fertilizer purposes and this added impetus to the mining of phosphate in Ontario and Quebec. From 1878 to 1892 inclusive, the industry in Canada was at its highest point, and 296,695 tons were produced. Exports during this 15-year period totalled 281,329 tons of which quantity Great Britain received approximately 86 per cent; the United States, 8 per cent; Germany, 5 per cent; and France, Denmark, Spain and Holland, the remainder. The maximum shipment of 31,753 tons was made in 1890. Since 1899, however, the annual production has exceeded the 1,500 ton mark only once.

The discovery and opening up in the United States of the large phosphate deposits in Florida in the nineties and later of those in Tennessee caused a sharp falling-off in prices for phosphate and resulted in the closing of the large Canadian mines.

The production of Canadian phosphate since 1895 has been mainly obtained as a by-product in the mining of mica. Activity in the phosphate industry in Canada has been practically negligible for a number of years.

There was no production of rock phosphate or apatite in Canada in 1931; during the previous year apatite shipments from deposits near Templeton, Quebec, amounted to 40 tons valued at \$760. In British Columbia the Consolidated Mining and Smelting Company continued underground work at the Martin mine, the width of bed and grade remaining practically the same as reported in 1930; development on the leases known as the Crow mine was continued until May and indicated further tonnages of 50 per cent tri-calcium phosphate over mineable widths. The Solar Development Company, allied to Consolidated Mining and Smelting Company, reports that the Star phosphate property at Paris, Idaho, was operated continuously and shipped 15,881 tons of phosphate rock to Tadanac, B.C. Some 1,800 tons of fertilizer were produced in the Warfield plant in British Columbia by the Consolidated Mining and Smelting Company and sold in the Prairie Provinces and British Columbia for 1931 spring seeding. The results were very gratifying. Substantial production of all three products ammonium sulphate, triple superphosphate, and ammonium phosphate, began in the autumn of 1931.

Table 249.—Production of Phosphate in Canada, by Provinces, 1922-1931

(For the years 1870 to 1921 see Mineral Production of Canada 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
1922.....	131	\$ 1,320	59	476	190	\$ 1,796
1923.....	30	600			30	600
1924.....						
1925.....	16	189			16	189
1926.....	40	800			40	800
1927.....	31	399	82	824	(a) 151	1,717
1928.....	91	1,126			(b) 641	8,276
1929.....	40	800			(c) 1,185	5,350
1930.....	40	760			40	760
1931.....						

(a) Includes 38 tons valued at \$494 shipped from British Columbia deposits.

(b) Includes 550 tons valued at \$7,150 shipped from British Columbia deposits.

(c) Includes 1,145 tons valued at \$4,580 shipped from British Columbia deposits.

Table 250.—Production in Canada, Imports and Exports of Phosphate, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION.....	1,185	\$ 5,380	40	760		
IMPORTS—						
Phosphate rock.....	18,192	114,741	47,206	297,522	141,722	619,079
Acid phosphate (not medicinal).....	1,491	223,157	1,263	179,996	1,278	188,884
Phosphorus.....	39	29,777	43	32,241	49	36,539
Superphosphate or acid phosphate of lime..	97,925	1,147,839	127,891	1,393,862	98,048	936,357
EXPORTS—Phosphate rock.....	52	1,408				

POTASH

Natural potash salts are not yet mined or recovered on an extensive commercial scale in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland county, N.S., and at Gautreau, Westmorland county, N.B. A search for beds of economic importance has been made and results so far obtained have been sufficiently promising to warrant future work. Potassium chloride so far opened up at Malagash occurs in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite. Small shipments of potash bearing salt have been made recently from the Malagash deposit; this salt was employed as a fertilizer.

Imports of kainite and other German potash salts into Canada during 1931 totalled 2,265 short tons valued at \$47,603 as compared with 2,668 tons worth \$62,565 in 1930; 28,861 tons of crude muriate of potash valued at \$974,602 were imported in 1931 as against 34,281 tons at \$1,246,638 in 1930; sulphate of potash imports in 1931 totalled 3,992 tons with a value of \$159,777; in 1930 the tonnage was 2,069 and the value, \$96,094.

Natro-Alunite.—Natro-alunite occurs at Easy Cove in the Kyuquot section, Quatsino mining division, British Columbia. Small shipments of this mineral have been made from the deposit; the property has been inactive since 1927 when an endeavour was made to develop a trade demand for this product, utilizing the potash content as a fertilizer. For historical tables showing production from this deposit see annual report on Mineral Production of Canada for 1930.

Table 251.—World Production of Potash Minerals, 1929-1931

(Long tons)

Country and Description	Potash Minerals			K ₂ O Content or equivalent		
	1929	1930	1931	1929	1930	1931
BRITISH EMPIRE						
Palestine—						
Carnallite.....			40,000			(a)
India—						
Nitrate (estimated).....	4,900	4,600	6,500	2,300	2,200	3,100
Australia—						
Alunite.....	38			3		
FOREIGN COUNTRIES						
France—						
K ₂ O Equivalent Sylvinite, etc.—						
12-16%.....	258,865	205,722	114,872	484,325	498,489	363,544
18-22%.....	699,859	650,748	447,697			
50% and over.....	405,328	467,958	363,544			
Germany—						
Kainite, Sylvinite, etc.....	10,824,575	9,935,271	6,881,691	1,540,548	1,406,851	961,232
Carnallite, etc.....	2,281,331	1,838,053	1,042,548	218,992	176,259	99,390
Italy—						
Leucite.....	37,131	40,500	10,000	(a)	(a)	(a)
Alunite.....	103	812	974	10	80	100
Poland—						
Kainite.....	135,681	99,191	58,186	13,568	9,919	5,819
Sylvite.....	217,283	201,591	199,006	48,900	(a)	(a)
Spain—(b)						
Crude salts.....	240,096	281,912	84,470	24,010	28,192	8,447
Nitrified earth.....	1,000	900	1,100	(a)	(a)	(a)
United States—						
Crude salts.....	96,268	94,473	119,571	54,991	54,705	57,036
Korea—						
Alunite (impure).....	10,641	11,523	(a)	(a)	(a)	(a)
World's total.....				2,390,000	2,220,000	1,560,000

(a) Information not available.

(b) In addition, 600 cubic metres of alunite were produced in 1929 and also in 1930.

PYRITES

Census returns for 1871 record a production of 2,800 tons of pyrites in Canada, made up of 2,300 tons from Quebec deposits and 500 tons from Ontario. However, it is only since 1886 that a continuous official record of pyrites production is available. Customs' records for the period 1881 to 1885 inclusive, show exports of 120,126 tons of pyrites to the United States. The 1886 output of pyrites was 42,906 tons, all of which was obtained from the Albert and Crown mines, Sherbrooke county, Quebec. In 1889, the production totalled 72,225 tons; shipments

ranged from 27,687 tons to 158,566 tons during the following 24 years. The war years, 1914-1918, brought about an increased demand for sulphuric acid and a consequent advance in the production of pyrites. Shipments during this period reached a grand total of 1.6 million tons or approximately 46 per cent of the total Canadian production from 1886 to 1927.

It has been the practice of the Bureau in past years to report export shipments of pyrites in terms of the sulphur content of the pyrites. In view of the fact that there is now an important production of sulphur in the form of sulphuric acid made from waste bessemer gases, it has been decided to modify the method of reporting production to show the total sulphur content of pyrites shipped and of bessemer gases used in the manufacture of sulphuric acid.

The sulphur content of pyrites shipped and of waste bessemer gases used in the manufacture of sulphuric acid amounted in 1931 to 50,107 tons valued at \$429,457 as compared with 37,730 tons worth \$314,835 in 1930. Pyrites concentrates were shipped from properties in Quebec and British Columbia; these were recovered in the mining and milling of copper ores. Sulphur employed in the manufacture of sulphuric acid was recovered from salvaged smelter gases in Ontario and British Columbia. The three 110 ton units at the sulphuric acid plants constructed by the Consolidated Mining and Smelting Company at Trail, B.C., were completed, the last going into operation in October, 1931. These plants all obtain their sulphur dioxide gas as a by-product from the zinc concentrates roasted in the concentrate burning furnaces. This sulphur recovery is not only very desirable but was one of the conditions of the Joint International Commission's recommendations. This condition has been fulfilled by these new plants which together with the 35 ton unit previously installed are capable of making about 375 tons of 100 per cent acid per day. During the year Canadian Industries Limited completed an oleum unit at Copper Cliff, Ontario. Pyrite concentrates, produced in Quebec, are now being employed to some extent in the Canadian pulp and paper industries.

Table 252.—Production of †Pyrites in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Pyrites	Sulphur Content	Value	Year	Pyrites	Sulphur Content	Value
	tons	tons	\$		tons	tons	\$
1922.....	18,143	6,900	74,303	1927.....	50,863	25,229	198,388
1923.....	28,591	11,073	113,020	1928.....	68,836	38,589	321,033
1924.....	23,552	9,742	95,620	1929.....		42,781	350,843
1925.....	15,605	7,587	58,899	1930.....		37,730	314,835
1926.....	17,845	8,975	63,899	1931.....		50,107	429,457

†Since 1928 includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making.

Table 253.—Production in Canada of Pyrites with Sulphur Content, including Sulphur Contained in Sulphuric Acid Made from Smelter Gases, 1930 and 1931

	Pyrites*			Smelter Gas		Total Sulphur	
	Sales	Sulphur Content		Sulphur Content		Tons	Value
	Tons	Tons	Value	Tons	Value		
1930			\$		\$		\$
Quebec.....	24,918	12,653	93,038			12,653	93,038
Ontario.....	141	56	1,645	7,221	72,210	7,277	73,855
British Columbia.....	28,535	15,029	120,232	2,771	27,710	17,800	147,942
Canada.....	53,594	27,738	214,915	9,992	99,920	37,730	314,835
1931							
Quebec.....	29,149	14,586	108,617			14,586	108,617
Ontario.....				6,508	65,080	6,508	65,080
British Columbia.....	34,144	17,185	137,490	11,828	118,280	29,013	255,760
Canada.....	63,293	31,771	246,097	18,336	183,360	50,107	429,457
				1930		1931	
IMPORTS—				Tons	\$	Tons	\$
Brimstone or sulphur, crude or in roll or flour				179,728	3,177,492	124,192	2,281,654
EXPORTS—							
Sulphur contained in pyrites.....				26,592	159,866	26,613	139,814
Sulphuric acid.....				570	6,530	996	18,507

*Includes iron pyrites concentrates made from copper ores.

Table 254.—World Production of Pyrites (Including Cupreous Pyrites), 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country	Pyrites			Estimated sulphur content		
	1929	1930	1931	1929	1930	1931
BRITISH EMPIRE						
United Kingdom.....	4,371	5,497	1,979	(a)	(a)	(a)
Union of South Africa.....	4,051	3,547	3,708	(a)	(a)	(a)
Canada (b).....	77,258	53,594	63,293	38,197	33,688	44,738
Cyprus.....	292,430	257,028	193,845	144,215	128,514	96,923
India.....	294			(a)		
Australia.....			507			(a)
Total.....	378,000	318,000	263,000			
FOREIGN COUNTRIES						
Czechoslovakia.....	22,642	23,253	20,367	8,943	9,185	8,045
France.....	(c) 198,996	194,536	189,686	(d) 90,023	89,900	87,200
Germany.....	346,351	285,165	220,459	147,614	122,163	95,025
Greece.....	131,292	175,000	139,208	62,941	84,054	66,292
Hungary.....	1,007	1,052	(a)	(a)	(a)	(a)
Italy.....	654,047	705,942	635,560	301,017	309,838	278,947
Jugoslavia.....	59,203	49,550	29,064	(a)	(a)	(a)
Norway.....	727,916	719,407	354,266	319,144	318,965	157,544
Poland.....	9,261	10,872	3,534	4,000	4,700	1,500
Portugal.....	378,279	393,902	282,671	190,000	200,000	140,000
Roumania.....	23,474	23,881	24,393	10,000	10,000	10,000
Russia (years ended Sept. 30).....	(a)	237,900	(a)	(a)	(a)	(a)
Spain.....	3,806,172	3,362,507	2,552,965	1,786,000	1,450,000	1,240,000
Sweden.....	70,917	59,486	56,699	31,575	27,295	35,423
Algeria.....	16,539	16,365	21,467	7,940	7,364	9,100
United States (d).....	333,465	347,512	330,848	120,371	124,226	119,000
Japan.....	608,971	552,532	551,522	(a)	(a)	(a)
Total.....	7,400,000	7,100,000	5,700,000			
Grand total.....	7,700,000	7,400,000	5,960,000			

(a) Information not available.

(b) Includes sulphur content of smelter gases used for acid making.

(c) Includes 3,429 tons of arsenical pyrites containing 1,347 tons of sulphur.

(d) Includes by-product pyrites from zinc operations in Wisconsin and New York, also pyrite and pyrrhotite concentrates from copper operations in Tennessee.

Table 255.—World Production of Sulphur, 1929-1931

(Supplied by *Imperial Institute*)

(Long tons)

Country and Description	1929	1930	1931	Country and Description	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom and Irish Free State.....				Ecuador—Sulphur.....	(a)	100	150
Spent oxide (b).....	174,500	155,432	124,200	Spain—Sulphur rock.....	73,029	99,295	64,284
New Zealand—Sulphur.....	967	849		Refined sulphur (c).....	23,588	21,577	21,155
Southern Rhodesia—Sulphur.....			100	United States—Crude sulphur.....	2,362,389	2,558,981	2,128,930
FOREIGN COUNTRIES—				Chile—Sulphur rock.....	16,043	18,184	5,018
France—Sulphur rock (sulphur content).....	4	(a)	(a)	China—Sulphur.....	8,300	10,600	9,900
Greece—Sulphur rock.....	1,743	3,588	5,312	Formosa—Sulphur.....	467	489	(a)
Refined sulphur.....	187	313	368	Japan—Sulphur rock.....	14,869	14,392	2,195
Italy—Crude sulphur—				Refined sulphur.....	64,430	61,375	60,528
Fused.....	318,720	345,024	348,131	Netherlands and East Indies—Sulphur.....	1,535	5,516	1,789
Ground.....	21,149	19,409	19,502	Turkey—Sulphur.....			73

(a) Information not available.

(b) Consumed by the sulphuric acid industry, average sulphur content was approximately—

1929.....

48.8%

1930.....

48.6%

1931.....

48.6%

(c) Partly from imported crude ore.

SULPHURIC ACID

Production of 66 degree Bé sulphuric acid in Canada in 1931 totalled 119,541 tons valued at \$1,171,227 at the works as compared with 107,352 tons worth \$1,347,525, in 1930. Exports of sulphuric acid from Canada amounted to 997 tons worth \$18,507 in 1931 as against 570 tons valued at \$6,530 in the previous year; practically all of this acid was shipped to the United States. Imports totalled only 80 tons appraised at \$10,561 and 149 tons at \$13,612 in 1930.

Seven Canadian plants manufactured sulphuric acid during 1931; two plants utilized smelter gases while the remainder consumed 8,908 tons of iron pyrites and 15,263 tons of imported sulphur. Acid was made in plants located in Ontario at Copper Cliff, Hamilton and Sulphide; in British Columbia at New Westminster, Trail, and Barnet, and in Nova Scotia at Sydney.

Table 256.—Production, Imports and Exports of Sulphuric Acid, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION—				\$		\$
Sulphur used.....	25,078	542,194	20,233	434,440	15,263	326,072
Pyrites used.....	10,461	53,008	8,241	46,883	8,908	58,379
Acid made*.....	110,749	1,375,599	107,352	1,347,525	119,541	1,171,227
IMPORTS of acid.....	111	10,287	149	13,612	80	10,561
EXPORTS of acid.....	8,397	91,634	570	6,530	997	18,507

* Expressed in terms of 66° Bé acid. Includes also the production of the Canadian Industries, Ltd., and Consolidated Mining and Smelting Co., Ltd., who now produce sulphuric acid from waste smelter gases.

SILICA BRICK

Production of silica brick in 1931 totalled 900 thousand valued at \$35,746 as compared with 2,418 thousand worth \$97,379 in 1930. In Nova Scotia the Dominion Steel and Coal Company Limited manufactured silica brick at Sydney from silica rock quarried at Leitches Creek, Nova Scotia, and at Sault Ste. Marie, Ontario, the Algoma Steel Corporation produced this product from quartz obtained along the Algoma Central Railway. Imports of firebrick containing not less than 90 per cent silica in 1931 were appraised at \$234,909 as compared with a valuation of \$315,039 in the preceding year.

SODIUM CARBONATE

Several lacustrine deposits of sodium carbonate occur in British Columbia and during 1931 shipments of sal soda were made from the Salso claims in the Kamloops division. Sal soda was also shipped from the Margaret and Anita claims at Davison Lake, Cariboo Road, the output from this latter property was consigned to soap plants. Shipments were made during the year from sodium carbonate deposits at Rose Lake near Coulson on the P.G.E.R.R.; Soda Mining and Products Limited operated at Rose Lake. Total production of sodium carbonate from Canadian deposits during 1931 amounted to 712 tons valued at \$7,351 as compared with 364 tons worth \$4,550 in 1930. Small annual shipments have been recorded from the British Columbia deposits since 1921; the maximum production, 1,120 tons valued at \$8,140, being shipped in 1925. Sodium carbonate is used largely in chemical and hydro-metallurgical plants. Its principal uses are, in the manufacture of glass, soap and paper; the bleaching and washing of linen, cotton, wool, etc., and the dyeing and printing of fabrics. Sodium carbonate has been utilized for some time as a means of removing, and of preventing the formation of boiler scale.

Soda ash from salt brine is made in Canada on a very large scale by Brunner Mond Company Limited, at Amherstburg, Ontario.

Table 257.—Production of Natural Sodium Carbonate in Canada, 1922-1931

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	202	3,027	1927.....	805	9,995
1923.....	265	3,975	1928.....	519	4,922
1924.....	510	5,173	1929.....	600	8,100
1925.....	1,120	8,140	1930.....	364	4,550
1926.....	595	5,370	1931.....	712	7,351

SODIUM SULPHATE (NATURAL)

Sodium sulphate occurs naturally in large deposits in Western Canada. During 1931 all shipments were made from the various deposits in Saskatchewan. Hydrous Glauber's salt was shipped to Eastern Canada from White Shore Lake, refined sodium sulphate went to paper mills in the United States and Canada from deposits at Frederick Lake, cleaned and dried crude sodium sulphate recovered at Ormiston was consigned to Copper Cliff, Ontario, for use in the metallurgical treatment of copper-nickel ores; shipments from other deposits were made to various points.

Artificial sodium sulphate is known as salt cake, and the usual process for producing it is from the action of sulphuric acid on natural sodium chloride. The salt for this process is preferably rock salt or the coarsest salt produced from evaporation. Sodium sulphate finds its principal use in the pulp and paper industry for the manufacture of "kraft paper" by the sulphate process, in the manufacture of glass, in the dyes industry, in the smelting of nickel-copper ores, and as one of the raw materials in the manufacture of sodium carbonate. Production of natural sodium sulphate in Canada during 1931 came entirely from the province of Saskatchewan and amounted to \$421,097 in value as compared with \$293,847 in 1930. It is reported that Canadian Industries Limited is designing a commercial plant to be constructed at Copper Cliff, Ontario, to produce sodium and aluminum sulphates from waste slag by a new process developed by this company. It is stated that a sufficient quantity of slag is produced at the International Nickel plants to allow approximately 15,000 tons of sodium sulphate and 25,000 tons of aluminum sulphate to be reclaimed annually.

One of the largest known deposits of natural sodium sulphate in the world is at Inglebright lake in Saskatchewan. It is stated that there are several million tons of sodium sulphate in these deposits.

Table 258.—Production of Natural Sodium Sulphate in Canada, 1922-1931

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	504	11,980	1927.....	5,659	11,319
1923.....	733	10,189	1928.....	6,016	68,804
1924.....	1,083	6,004	1929.....	5,018	64,112
1925.....	3,876	19,380	1930.....		293,847
1926.....	6,775	13,550	1931.....		421,097

Table 259.—Production in Canada and Imports of Sodium Sulphate, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Natural Sodium Sulphate—						
Crude.....	5,018	64,112	293,847			421,097
IMPORTS—						
Soda, bisulphate of, or nitre cake.....	80,872	1,081,984	15,275	219,173	14,258	175,648
Soda, sulphate of, crude, known as salt cake.....	39,512	514,212	24,553	395,236	8,660	97,215
Glauber's salt.....	362	4,450	747	9,664	999	10,838
Soda ash or barilla.....	1,645	44,300	1,520	45,310	823	25,771

CHAPTER NINE

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, Slate and Stone.

During the past twenty-four years the production in the clay products and other structural materials industries has increased from a valuation of \$12,863,049 in 1907 to \$44,158,295 in 1931. Owing to the continuance of the widespread business depression and curtailment in construction program which existed in 1930, the value of the 1931 output in these commodities showed a considerable recession from the record of \$58,534,834 in 1929 and also from the 1930 valuation of \$53,727,465. Cement production in 1931 totalled 10,161,658 barrels valued at \$15,826,243 as compared with 11,032,538 barrels worth \$17,713,067 in 1930. Shipments of lime during 1931 were valued at \$2,764,415 as against \$4,038,698 in 1930 and \$5,908,610 in 1929. The stone industry was also seriously affected by the increasing inactivity in the building trades, the valuation of the Canadian stone output in 1931 totalling \$11,070,184 as against \$13,034,209 in 1930. Sand and gravel production in 1931 amounted in value to \$6,651,165; this represents a decrease of \$1,693,748 from the output of the preceding year.

Contracts awarded for building and construction in Canada in 1912 as reported by MacLean Building Review were valued at \$463,083,000. In 1913 contracts awarded totalled \$384,157,000, and in the following year a decrease to \$241,952,000 was recorded. During the war period (1915-1918) construction was largely neglected and the value of building awards remained below the one hundred million dollar mark. A revival of building set in after the war, and in each year since 1920, the volume of building has been well above the two hundred million dollar mark.

The value of all contracts awarded during 1931 as compiled by the MacLean Building Reports Limited, amounted to \$315,482,000 as compared with \$456,999,600 in 1930 and \$576,651,800 in 1929. While these figures reveal a large decrease from 1929, it should be realized that 1929 witnessed the greatest building "boom" in the history of Canada, construction in that year being 22.1 per cent in excess of 1928, the second highest year ever recorded for this Canadian industry.

Table 260.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1929-1931

Province	1929	1930	1931
	\$	\$	\$
Nova Scotia.....	1,334,934	1,239,306	970,933
New Brunswick.....	585,696	624,012	630,542
Quebec.....	18,424,828	17,966,698	18,104,022
Ontario.....	25,001,461	21,812,563	15,225,817
Manitoba.....	4,291,397	4,284,457	2,534,749
Saskatchewan.....	1,190,168	1,101,062	562,964
Alberta.....	3,665,321	2,646,327	2,185,839
British Columbia.....	4,041,029	4,053,040	3,943,429
Canada.....	58,534,834	53,727,465	44,158,295

Table 261.—Production, Imports, Exports and Apparent Consumption of Clay Products and Other Structural Materials in Canada, 1929-1931

Item		Production	Imports	Exports	Apparent consumption
		\$	\$	\$	\$
Cement, Portland.....	1929	19,337,235	†254,111	252,955	19,338,391
	1930	17,713,067	†604,520	212,071	18,105,516
	1931	15,826,243	†156,734	124,267	15,858,710
Clay and clay products.....	1929	13,904,643	12,159,566	375,506	25,688,703
	1930	10,593,578	10,196,681	449,120	20,341,139
	1931	7,841,288	7,628,858	418,528	15,051,618
Lime.....	1929	5,908,610	49,395	428,209	5,529,796
	1930	4,038,698	28,107	444,728	4,022,077
	1931	2,764,415	10,561	283,459	2,491,517
*Sand and gravel.....	1929	7,317,814	707,476	441,798	7,583,492
	1930	8,344,913	520,438	465,292	8,396,971
	1931	6,651,165	375,126	146,060	6,880,231
Slate.....	1929	.....	296,638	.....	296,638
	1930	3,000	205,978	.....	208,978
	1931	5,000	155,008	.....	160,008
Stone.....	1929	12,066,532	2,068,453	237,121	13,897,864
	1930	13,034,209	1,740,508	277,258	14,497,509
	1931	11,070,184	939,192	192,365	11,817,011
Total.....	1929	58,534,834	15,535,639	1,735,559	72,334,884
	1930	53,727,465	13,296,232	1,848,469	65,572,190
	1931	44,158,295	9,265,479	1,164,679	52,259,095

*Sand and gravel imports include silica sand for glass and carborundum manufacture and for use in steel plants. This was valued at \$352,796 in 1930 and \$235,191 in 1931.

†Includes cement manufactures.

CEMENT

Although the first official record of the production of cement in Canada is that of the manufacture of hydraulic cement from the black limestones of Quebec in 1856, it is understood that lime and hydraulic cement were made at Hull between 1830 and 1840. The cement was manufactured from a grey argillaceous magnesian limestone obtained nearby. Plants were also operated at an early date at the mouth of the Magdalen river, Gaspé county, and in Argenteuil county, Quebec; in Ontario, at Kingston and Thorold.

It was not until 1887 that serious competition to the domestic production showed itself in large importations of Portland cement. In order to cope with this competition two Canadian manufacturers of natural cement changed their mills and processes. Canadian Portland cement made its appearance on the market in 1889. Two additional plants were constructed about this time; one at Shallow Lake, Ontario, and another at Longue Pointe, Quebec.

The period 1898 to 1905 witnessed a boom in the construction and promotion of cement plants in Canada. Eleven marl plants were erected during these years, of which only three were really successful.

In Nova Scotia puzzolan cement was first produced from blast furnace slag and lime, at Sydney, in 1905. This plant was closed down in 1915, re-opened in 1920, but has been idle since 1921. For a more detailed historical summary of Canadian cement production see 1930 annual report—Mineral Production of Canada.

Shipments from Canadian cement plants during 1931 totalled 10,161,658 barrels valued at \$15,826,243 as compared with 11,032,538 barrels worth \$17,713,067 in 1930.

Cement was produced in 1931 at plants located in Quebec, Ontario, Manitoba, Alberta and British Columbia. Quebec mills produced 49 per cent of the total Canadian shipments, Ontario 34 per cent, Manitoba 5 per cent, Alberta 6 per cent, and British Columbia 6 per cent.

Imports of Portland cement into Canada during 1931 amounted to 38,392 barrels (estimated at 350 pounds each) averaging \$3.74 per barrel as against 143,436 barrels averaging \$3.97 in 1930. Exports of Portland cement were recorded at 114,064 barrels valued at \$124,267 as compared with 198,736 barrels worth \$212,071 in 1930. Cement made available for consumption in Canada amounted to 10,085,986 barrels in 1931.

The selling prices in 1931, f.o.b. Canadian works, were: high, \$2.60 per barrel, and low, \$1.28 per barrel.

The Canadian cement plants employed in 1931, 43 rotary kilns and one of the vertical type; these possessed a total daily capacity of 42,422 barrels. The industry consumed 2,489,147 tons of limestone and 56,677 tons of gypsum. Plants east of the Great Lakes used gypsum quarried either in Ontario or the Maritime Provinces while western plants employed gypsum produced in Manitoba or British Columbia. One plant utilized shale from Jasper, Alberta. Both the wet and dry processes were employed during the year, the latter process predominating.

The United States Bureau of Mines reports the average consumption of fuel per barrel of cement (376 lbs.) produced in 1930 as follows:—coal, 127.9 pounds; oil, 0.2515 barrel; natural gas, 1,916.8 cubic feet. Sixty-five wet process plants in the United States reported the use of coal alone as fuel in 1930 with an average consumption of 132.3 pounds of coal per barrel of finished cement; in 1929, 64 wet process plants reported the use of coal alone with an average consumption of 139.1 pounds of coal per barrel of finished cement.

A report on "Limestone in Industry" by M. F. Goudge of the Mines Branch, Department of Mines, Ottawa, states that a finished Portland cement should analyse 60 to 65 per cent CaO, 20 to 25 per cent SiO₂, 5 to 12 per cent combined Al₂O₃, and Fe₂O₃ and less than 4 per cent MgO. At several places in Canada an impure limestone is obtainable which on burning will yield a true Portland cement. In most cases, however, the limestone is too pure and to obtain the correct chemical composition, clay or shale must be added before burning. Magnesia is the important factor in connection with a limestone for Portland cement manufacture. A limestone as low as possible in magnesia is preferred.

Table 262.—Capital Employed in the Cement Industry in Canada, 1930 and 1931

	1930	1931
	\$	\$
1. Capital employed as represented by:		
(a) Cost of lands, buildings, plant, machinery and tools (Estimated value if rented).....	52,048,878	50,132,019
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	3,478,954	1,189,710
†(c) Inventory value of finished products on hand.....		2,003,235
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	3,682,905	4,051,472
Total.....	59,210,737	57,378,436

†Included with item (b) in 1930.

Table 263.—Employees, Salaries and Wages in the Cement Industry in Canada, 1930 and 1931

Class	1930		1931	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
SALARIED EMPLOYEES.....	126	267,003	121	268,434
WAGE-EARNERS.....	2,191	2,905,195	1,699	2,164,516
Total.....	2,317	3,172,198	1,820	2,432,950

Table 264.—Production of Cement in Canada, 1922-1931

(For the years 1887 to 1921 see Mineral Production of Canada, 1928)

Year	Barrels	Value	Year	Barrels	Value
		\$			\$
1922.....	6,943,972	15,438,481	1927.....	10,065,865	14,391,937
1923.....	7,543,589	15,064,661	1928.....	11,023,928	16,739,163
1924.....	7,498,624	13,398,411	1929.....	12,284,081	19,337,235
1925.....	8,116,597	14,046,704	1930.....	11,032,538	17,713,067
1926.....	8,707,021	13,013,283	1931.....	10,161,658	15,826,243

Table 265.—Output, Sales, Imports, Exports and Consumption of Cement in Canada, 1929-1931

	1929		1930		1931	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
OUTPUT.....	12,252,203		11,790,408		10,197,964	
SOLD OR USED.....	12,284,081	19,337,235	11,032,538	17,713,067	10,161,658	15,826,243
STOCKS DEC. 31.....	1,488,751		2,246,621		2,286,927	
IMPORTS—						
Portland cement.....	55,980	189,169	143,436	569,848	38,392	143,491
Manufactures.....		64,942		34,672		13,243
EXPORTS.....	234,111	252,955	198,736	212,071	114,064	124,267
APPARENT CONSUMPTION.....	12,105,950		10,977,238		10,085,986	

Table 266.—Production of Cement in Canada, by Provinces, 1929-1931

Province	1929		1930		1931	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	5,169,408	7,120,374	4,865,609	7,031,528	4,942,323	7,092,895
Ontario.....	4,624,712	6,608,246	3,942,690	5,779,404	3,470,056	5,006,826
Manitoba.....	1,000,258	2,350,606	977,906	2,268,742	544,160	1,267,893
Alberta.....	808,796	1,770,786	525,289	1,144,160	626,483	1,286,080
British Columbia.....	680,907	1,487,223	721,044	1,489,233	578,636	1,172,549
Canada.....	12,284,081	19,337,235	11,032,538	17,713,067	10,161,658	15,826,243

CLAY AND CLAY PRODUCTS

Under "Clay and Clay Products" there have been included statistics relating to production in Canada from domestic clays, of (a) fireclay; (b) fireclay blocks and shapes; (c) firebrick; (d) brick made by the different processes, such as the soft mud process, stiff mud process and dry press; (e) structural tile, such as hollow blocks, roofing tile and floor tile (quarries); (f) drain tile; (g) sewer pipe, including copings, flue linings, etc., and (h) pottery.

The clay products industry has been carried on in Canada for many years; census records for 1871 show 426 brick and tile producers in Canada, employing 3,073 workers whose wages totalled \$399,698. The value of products made in that year was \$925,235. Corresponding with the growth of the country, ten years later, the number of plants in operation had risen to 560, with a payroll of 4,129 employees, wages amounting to \$608,690 and a production value of \$1,541,892. Statistics for 1886, record 261 brick and 82 tile plants in operation with a total output valued at \$1,126,057. Building brick (common and pressed) was produced in increasing quantities from the beginning of the century; 1900 recorded a valuation of \$2,275,000 while in 1906, the sum of \$4,102,590 was realized from the sale of these products. Almost similar conditions applied to the activities of the plants producing other clay products.

The value of domestic clay and clay products sold by 175 Canadian producers during 1931 declined 25.9 per cent below the preceding year. Sales in 1931 reached a total value of \$7,841,288 as compared with \$10,593,578 in 1930 and \$13,904,643 in 1929. Ontario was the leading producing province, accounting for 45 per cent of the total sales during the year. Quebec production contributed 30 per cent and the other provinces in order of their production values were Alberta, British Columbia, Nova Scotia, Saskatchewan, New Brunswick and Manitoba.

Canada's imports of clay and clay products during 1931 were valued at \$7,628,858 as compared with \$10,196,681 during the preceding year; the 1931 importations from the United States were valued at \$3,093,775; from the United Kingdom, \$3,389,950; from Japan, \$336,897; from Czechoslovakia, \$220,452; from Germany, \$258,577; from France, \$133,834, and minor amounts from other countries. Pottery and chinaware imports accounted for 47.7 per cent of the total clay and clay products importations; refractory brick, 16.4 per cent; clays, 7.1 per cent; sanitary ware, 5.2 per cent; building bricks and blocks, 3.7 per cent; and porcelain insulators, 3.0 per cent.

Exports from Canada of clays, building bricks, porcelain insulators, earthenware and other clay manufactures were valued at \$418,528 as compared with \$449,120 in 1930. The United Kingdom received 41.0 per cent of these exports.

Plants reporting shipments of clay products during 1931 comprised six in Nova Scotia, five in New Brunswick, twenty in Quebec, one hundred and twenty-two in Ontario, five in Manitoba, five in Saskatchewan, nine in Alberta, and seventeen in British Columbia. Included in these were the following potteries: one in New Brunswick, one in Ontario, one in Alberta and one in British Columbia.

Brick.—Common and pressed brick produced in Canada during 1886 had a value of \$873,600; the plants in operation were located in Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Northwest Territories and British Columbia. Progress in the brick industry was recorded during the succeeding twenty years and in 1906 the value of common and pressed brick produced reached a total of \$4,102,590. In the following year, data were obtained separating the production of these two classes of brick: 439,016,000 common brick valued at \$3,455,524 and 78,922,000 pressed brick worth \$794,722 were shipped during 1907.

Common brick production reached its highest point in 1912 when 769,192,000 at an average value of \$9.11 per thousand, were shipped. During the same year pressed brick production established a record at 125,180,000 with an average value of \$12.86 per thousand. Since 1917, the value per thousand has never fallen as low as the average price in 1912.

Paving brick production in Canada was first recorded in 1897 when 4,568,000 were shipped by plants at Toronto, Ontario. During the period 1899-1907, the average annual production was 3,917,000. Prior to 1914 the total Canadian output of paving brick came from West Toronto, Ontario, where shale from the banks of the Humber river was used. In 1914, 1915 and 1916 the Clayburn plant in British Columbia produced a small quantity. In 1916 a plant at Edmonton, Alberta, produced a small quantity of paving brick. During the succeeding five years there was no production, but in 1922, the Clayburn plant shipped 151,000. Production ceased until 1926, when the British Columbia plant made shipments of 122,000 paving brick. In the following year a small shipment was made from this plant. The 1931 shipments consisted of 19,000, all from the Clayburn and Kilgard plants in British Columbia. The plant at Clayburn has been dismantled and all operations are now carried on at the new factory at Kilgard. The value of building brick produced in Canada in 1931 totalled \$4,289,119 as compared with \$5,581,501 in 1930.

Stoneware and Pottery from Domestic Clays.—Records for 1888 show shipments of pottery from Canadian plants valued at \$27,750; within the next four years the production had increased to nearly ten times that value. Production thereafter varied but remained above \$100,000 each year to the end of 1911. From 1912 to 1916, values ranged between \$35,371 and \$64,900. During the following years a considerable improvement was revealed in annual sales. In 1931 a valuation of \$257,125 was recorded as compared with \$294,866 in the previous year.

Plants with total assets of \$659,500 were engaged primarily in the production of stoneware and pottery from Canadian clays in 1931. Employees in the industry totalled 128 persons whose earnings were \$113,108.

In New Brunswick, a plant at Saint John produces stoneware, Rockingham ware and flower pots from Canadian clay. Flower pots are also produced from local clays at Hamilton, Ontario; Medicine Hat, Alberta, and at Vancouver and Victoria, British Columbia. Pottery and decorated art ware are produced by the Medalta Potteries Limited, Medicine Hat, Alberta

Fireclay.—Clays from the Drummond Colliery at Westville, Nova Scotia, and from Flower Cove, New Brunswick, have been used for the manufacture of refractory products.

In Quebec, the discoloured portions of the kaolin found at St. Rémi d'Amherst can be utilized as a fireclay.

Cretaceous deposits of refractory clays in the valleys of the Abitibi, Mattagami and Missinaibi rivers, which flow northward on the James Bay slope, in Ontario, have been known for many years. The recent extension of the Temiskaming and Northern Ontario Railway from Cochrane to Moose Factory may prove instrumental in the possible economic development of these clays.

Semi-refractory shale is found in Turtle Mountain, at La Rivière and near Virden in the Assiniboine valley, Manitoba.

Refractory and semi-refractory clays occur in southern Saskatchewan. At Claybank in the Dirt Hills, south of Moose Jaw, standard firebrick, special shapes and face brick, are made from local clays. Similar clays are found near Michellton at Willows, south of Twelve Mile Lake, and along the Frenchman river valley in the Cypress hills.

Along the Athabasca river, near Fort McMurray, refractory and semi-refractory clays are found associated with tar sands.

A very important deposit of fireclay occurs in Sumas Mountain about 40 miles eastward from Vancouver, British Columbia; at Kilgard in the same province, refractory products are made from this clay. Refractory shales also occur near Whonnock and a residual fireclay deposit at Kyuquot, Vancouver Island, is operated; this clay is shipped to Victoria for the manufacture of stove linings and sewer pipe.

In 1889, the first production of fireclay in Canada was recorded at 400 tons valued at \$4,800. The maximum tonnage production for the industry was reached in 1917 when 10,534 tons were shipped. During 1931 total shipments from Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia amounted to 1,233 tons valued at \$14,857. Imports of fireclay into Canada in 1931 totalled 44,351 tons evaluated at \$167,893.

Firebrick.—Firebrick production in Canada from domestic clays reached its height in 1917 when 8,192,000 were produced with an average selling value of \$24.31 per thousand. Although sales have been smaller during the following years, higher prices prevailed and thus the 1917 aggregate valuation has been exceeded annually with the exception of 1926 and 1931. Production in Canada during 1931 totalled 2,248,000 valued at \$107,597 as compared with 3,789,000 worth \$177,608 in the preceding year.

Fireclay Blocks and Shapes.—Plants in Nova Scotia, New Brunswick, Saskatchewan and British Columbia produce special fireclay blocks and shapes from domestic clays. In 1907 the output of this class of refractory products was valued at \$18,000. Production increased and in 1930 a record for the industry was established with a valuation of \$147,309, an increase of \$16,898 over the previous record of \$130,411 established in 1929. In 1931 the value of production totalled \$83,039 a decrease of 43.6 per cent from that of the previous year.

Plants in Canada, located at Montreal, Saint Johns, Toronto, Port Robinson and Hamilton, produce special refractory blocks and shapes from imported clays.

Drain Tile.—Data regarding the production of drain tile in Canada are available since 1891. From information obtained by the *Ontario Department of Mines*, production during that year was valued at \$90,000. Ten years later production had increased until a valuation of \$250,000 was reached. During 1931 drain tile shipments totalled 12,518,000 valued at \$328,410 as compared with 25,291,000 worth \$687,070 in 1930.

Kaolin.—Deposits of kaolin at St. Rémi d'Amherst were first noted by the Geological Survey in 1894. Two years later samples were shipped to porcelain plants at Trenton, New Jersey, but it was not until 1911 that any serious attempt was made to develop this property. Production commenced in 1912, when 20 tons were shipped. Increases were recorded annually until the maximum production of 1,750 tons for the industry was reached in 1916. Shipments

continued up to 1923, in which year, 163 tons were sold. No commercial shipments of kaolin have been made from Canadian deposits since 1923. During 1927 and 1928 small shipments were made from the St. Rémi d'Amherst deposit for testing purposes.

Some development work was done during recent years on the china clay deposits on the Mattagami river, near Long Falls, Temiskaming district, Ontario.

Other Clays.—Occasional shipments of bentonite, have been made since 1926. This clay is associated with the coal seams near Princeton, British Columbia; it is used as a filler and for various manufacturing purposes. Production in 1931 totalled 187 tons valued at \$935, which came entirely from the Princeton occurrences. During 1926 development work was done near Williams lake, British Columbia, on a deposit of a refractory material known locally as kaolin but described merely as "silicate of alumina" by the Provincial Mineralogist; 129 tons valued at \$1,900 were produced. This material was shipped to Vancouver, British Columbia, where some was used in the manufacture of plastic firebrick and refractory cements, and some directly as fireclay. Some small shipments of white ball clay have been made to the United States from Saskatchewan deposits.

Production of "Haydite", a patented building material, began in Ontario in the spring of 1929. The process involves the burning of shale or clay to clinker, the gases formed causing expansion of the clay or shale into a light weight, vitrified, cellular product. The clinker is crushed and screened, the product may be used as aggregate for concrete or moulded into blocks.

Sewer Pipe.—Records of sewer pipe production in Canada date back to 1888 when shipments of this commodity were valued at \$266,320. Production during the succeeding years varied considerably until in 1907 a valuation of \$667,100 was recorded. Seven years later, 1914, the sewer pipe production was valued at \$1,104,499.

In 1931 sewer pipe, copings, and flue linings to a value of \$1,508,803 were shipped from plants in Nova Scotia, Quebec, Ontario, Alberta, and British Columbia, as compared with a corresponding value of \$1,721,815 in 1930

Structural Tile.—Records of the production of structural tile in Canada include such items as hollow blocks (fireproofing and load-bearing tile), roofing tile, and floor tile. Hollow blocks are produced in every province except Prince Edward Island.

Roofing tile is made in Ontario and floor tile (quarries) in both Ontario and Saskatchewan. The total production of structural tile in Canada during 1931 was valued at \$1,078,769 as compared with a value of \$1,724,369 in the previous year and \$2,289,198 in 1929.

Clays.—The Ontario Department of Mines in a recent report on the ceramic industry of Ontario supplies the following information regarding clays: Clays are roughly classed as kaolins, ball clays, fireclays, stoneware clays, common clays and shale, depending upon their purity and physical condition.

Kaolin, often called China clay, is used in the manufacture of white tableware, porcelain, sanitary goods, floor tile, wall tile, etc. In the paper mills it is used as a filler for the best grades of white paper and for wall paper. Kaolin is a refractory and will soften at about cone 34 or 1760 deg. C. (3200 deg. F.).

Ball Clay.—Almost all white porcelain and pottery bodies contain kaolin, feldspar, ground silica and ball clay. The ball clay is not as pure as kaolin but is more plastic and adds to the strength of the product. Ball clay will soften at about 32 to 33 or 1700 deg. to 1745 deg. C.

Fireclay.—Clays of this type are usually still more impure burning to a buff instead of a white; the classification proposed by the American Society for testing materials for clay firebrick is as follows:—

No. 1 Heavy heat duty.....	Minimum cone 31 — 1680 deg. C.
No. 2 Intermediate heat duty.....	" 28 — 1615 deg. C.
No. 3 Moderate heat duty.....	" 26 — 1595 deg. C.
No. 4 Low heat duty.....	" 19 — 1515 deg. C.

Stoneware Clays. These overlap with the fireclays in refractoriness and may extend to a somewhat lower temperature. They must be of good plasticity, smooth and fine grained in texture, of good tensile strength in the unburned state and must vitrify without excessive burning shrinkage.

Sewer-pipe Clay.—This clay is not a separate type but is usually a subdivision under fire-clay, stoneware clay or shale. It should burn to a vitrified body or at least to a very low porosity with a reasonable firing shrinkage and should allow salt glazing.

Paving Brick Clay.—This is not a separate type; paving brick are usually made from red burning shales which are low in lime, have a long vitrification range and a vitrified tough body.

Potters Clay.—This is not a separate type. Almost any clay that will work well in moulding and drying can be made into some type of pottery. When an opaque glaze is used, the colour to which the clay burns is often not essential.

Common or Brick Clays.—These are usually soft, young, surface clays being very impure and having low refractoriness. The softening point is seldom above cone 7, 1210 deg. C. Such clays, which may be manufactured into soft mud or stiff mud brick with satisfactory burned properties, are used for both common and face purposes.

Shale.—Shales are older clays, often of the same purity and refractoriness as common surface clays, some, however, may be more refractory. Owing usually to their hardness they have little plasticity as compared to clays. Fine grinding and mixing with softer surface material allows them to be worked. They make excellent face brick.

Table 267.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1930 and 1931

Industry and Province	1930				1931				
	Capital employed as represented by				Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Inventory value of material on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills, and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	†\$	\$	\$
By Industries—									
<i>*Brick and Tile—</i>									
Nova Scotia.....	756,432	150,587	67,630	974,649	797,896	76,777	92,311	41,220	1,008,204
New Brunswick.....	209,196	36,156	26,271	271,623	189,580	6,053	40,192	26,940	262,765
Quebec.....	9,597,458	1,070,198	759,525	11,427,181	10,190,299	201,878	929,250	774,339	12,095,766
Ontario.....	10,448,974	1,831,769	2,078,029	14,358,772	10,690,336	244,379	1,358,197	1,987,716	14,280,628
Manitoba.....	247,575	67,953	134,591	450,119	260,701	59,141	63,885	124,507	508,234
Saskatchewan.....	926,098	110,148	105,305	1,141,551	883,806	5,105	71,800	66,930	1,027,641
Alberta.....	1,835,128	272,723	548,786	2,656,637	1,829,747	50,271	217,991	218,718	2,316,727
British Columbia ..	1,153,770	196,502	127,122	1,477,394	1,245,755	25,280	225,059	163,605	1,659,699
Total for Canada..	25,174,631	3,736,036	3,847,259	32,757,926	26,088,120	668,884	2,998,685	3,403,975	33,159,664
<i>Stoneware and pottery—</i>									
Total for Canada..	497,423	100,333	75,095	672,851	488,776	22,342	76,373	72,009	659,500
By Provinces—									
<i>Total for clay and clay products—</i>									
Nova Scotia.....	756,432	150,587	67,630	974,649	797,896	76,777	92,311	41,220	1,008,204
New Brunswick.....	234,196	36,156	26,271	296,623	199,980	8,104	48,899	33,117	270,100
Quebec.....	9,597,458	1,070,198	759,525	11,427,181	10,190,299	201,878	929,250	774,339	12,095,766
Ontario.....	10,520,257	1,839,669	2,126,682	14,486,608	10,745,336	245,979	1,366,418	2,027,716	14,385,449
Manitoba.....	247,575	67,953	134,591	450,119	260,701	59,141	63,885	124,507	508,234
Saskatchewan.....	926,098	110,148	105,305	1,141,551	883,806	5,105	71,800	66,930	1,027,641
Alberta.....	2,236,268	365,156	575,228	3,176,652	2,253,123	68,962	277,436	244,550	2,844,071
British Columbia ..	1,153,770	196,502	127,122	1,477,394	1,245,755	25,280	225,059	163,605	1,659,699
Canada.....	25,672,054	3,836,369	3,922,354	33,430,777	26,576,896	691,226	3,075,058	3,475,984	33,819,164

*Clay, sewer pipe, firebrick, firebrick products and other clays included under Brick and Tile.

†Included in 1930 under cost of supplies and stocks on hand.

Table 268.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1930				\$	\$	\$
Nova Scotia.....	12	218	230	29,900	161,752	191,652
New Brunswick.....	7	106	113	12,852	66,743	79,595
Quebec.....	78	992	1,070	193,278	860,927	1,054,205
Ontario.....	212	2,133	2,345	481,392	1,873,798	2,355,190
Manitoba.....	14	226	240	28,220	112,539	140,759
Saskatchewan.....	21	166	187	41,853	137,381	179,234
Alberta.....	31	403	434	87,060	435,140	522,200
British Columbia.....	24	383	407	47,944	390,351	438,295
Canada.....	399	4,627	5,026	922,499	4,038,631	4,961,130
1931						
Nova Scotia.....	12	148	160	27,837	120,608	148,445
New Brunswick.....	9	68	77	20,084	46,728	66,812
Quebec.....	107	771	878	245,432	782,010	1,027,442
Ontario.....	219	1,225	1,444	446,711	1,170,337	1,617,048
Manitoba.....	10	79	95	26,400	50,872	77,272
Saskatchewan.....	14	63	77	27,738	37,538	65,276
Alberta.....	34	220	254	77,977	197,160	275,137
British Columbia.....	24	250	274	46,602	217,216	263,818
Canada.....	435	2,824	3,259	918,781	2,622,469	3,541,250

*See note page 35.

In this section all tables except Table 271 show data for domestic clay products only.

Table 269.—Production of Clay Products in Canada from Domestic Clays, by Provinces, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1922.....	3,975	427,643	75,425	2,494,236	6,944,218	210,740	134,704	700,063	447,452	11,438,456
1923.....		413,974	62,587	2,439,598	6,270,615	160,134	119,405	590,565	426,138	10,483,016
1924.....	3,340	355,948	74,994	2,435,695	5,089,299	117,450	137,280	540,477	460,594	9,215,077
1925.....	3,020	422,690	69,473	2,426,887	5,195,084	173,794	95,952	618,860	523,931	9,529,691
1926.....		362,667	75,851	2,702,298	5,356,469	248,497	214,113	804,933	592,495	10,357,323
1927.....		416,417	87,185	2,734,738	5,853,035	201,464	311,204	889,358	679,788	11,173,189
1928.....		496,577	72,192	3,097,295	6,177,664	291,791	377,896	1,162,264	706,039	12,381,718
1929.....		653,157	160,006	3,187,702	6,830,162	362,240	502,522	1,342,427	866,427	13,904,643
1930.....		495,333	162,536	2,464,044	5,221,214	215,967	349,283	997,685	687,516	10,593,578
1931.....		467,126	143,348	2,360,908	3,552,800	122,628	166,257	529,716	498,505	7,841,288

Table 270.—Production of Clay Products in Canada, from Domestic Clays, by Provinces, 1929-1931

Province	1929		1930		1931	
	Sold or used	Per cent of total value	Sold or used	Per cent of total value	Sold or used	Per cent of total value
	\$		\$		\$	
Nova Scotia.....	653,157	4.70	495,333	4.7	467,126	6.0
New Brunswick.....	160,006	1.15	162,536	1.5	143,348	2.0
Quebec.....	3,187,702	22.93	2,464,044	23.3	2,360,908	30.0
Ontario.....	6,830,162	49.12	5,221,214	49.3	3,552,800	45.0
Manitoba.....	362,240	2.61	215,967	2.0	122,628	2.0
Saskatchewan.....	502,522	3.61	349,283	3.3	166,257	2.0
Alberta.....	1,342,427	9.65	997,685	9.4	529,716	7.0
British Columbia.....	866,427	6.23	687,516	6.5	498,505	6.0
Canada.....	13,901,643	100.00	10,593,578	100.0	7,841,288	100.0

Table 271.—Value of Clay Products Produced in Canada from Domestic and from Imported Clays, 1930 and 1931

Product	From domestic clays		From imported clays		Total	
	1930	1931	1930	1931	1930	1931
	\$	\$	\$	\$	\$	\$
†Fireclay blocks and shapes.....	147,309	83,039	298,945	280,588	446,254	363,627
Sanitary ware.....			*	*		
Ceramic or glazed floor and wall tile.....			*	*		
Pottery, glazed and unglazed.....	294,866	257,125	*	*	294,866	257,125
Electrical porcelain insulators.....			*	*		
Other clay products (brick, tile, sewer pipe, etc.).....	10,151,403	7,501,124	2,679,198	2,175,150	12,830,601	9,676,274
Total.....	10,593,578	7,841,288	2,978,143	2,455,738	13,571,721	10,297,026

*Included with other clay products.

†Includes firebrick made in imported-clay products industries.

Table 273.—Production of Building Brick in Canada by Provinces, 1929-1931

—		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
1929									
Soft mud process	Face.....	M 185	60	1,000	25,379				
		\$ 2,405	1,500	12,000	522,191				
Common.....		M 757	3,471	7,468	38,055	14,409	473	3,390	9,376
		\$ 10,020	55,120	76,963	606,714	234,481	7,031	45,932	159,250
Stiff mud process (wire cut)	Face.....	M 1,651	432	38,146	63,569	3,040	2,071	2,281	2,903
		\$ 44,654	10,808	771,573	1,333,723	70,940	62,790	67,166	107,763
Common.....		M 12,818	2,124	99,818	31,525		10,573	13,896	86
		\$ 160,906	31,860	1,529,751	505,958		121,833	157,250	1,893
Dry press	Face.....	M		2,990	30,292		1,184	4,125	
		\$		81,333	611,625		38,652	81,851	
Common.....		M			5,482			18,322	2,327
		\$			76,016			254,472	37,551
Fancy or ornamental brick.....		M		75	112				
		\$		3,783	9,012				
Sewer brick.....		M			4,631				134
		\$			92,316				4,272
Total.....		M	15,411	6,087	149,497	199,045	17,449	42,014	14,826
		\$	217,985	99,288	2,475,493	3,757,555	305,421	605,671	310,729
1930									
Soft mud process	Face.....	M 240			9,798			1,312	
		\$ 3,360			201,860			42,000	
Common.....		M 730	3,877	1,258	24,674	9,720	1,189	7,298	7,741
		\$ 9,718	62,625	12,754	375,088	156,585	16,867	92,158	136,010
Stiff mud process (wire cut)	Face.....	M 962	1,124	33,585	57,001	1,204	1,691	2,589	1,128
		\$ 26,608	27,836	743,641	1,178,026	26,604	54,842	37,468	40,846
Common.....		M 7,212	1,913	65,867	22,800		4,823	2,258	352
		\$ 98,133	28,711	927,218	346,126		55,159	20,549	5,069
Dry press	Face.....	M		2,660	21,835		282	3,751	906
		\$		67,291	431,683		9,058	61,616	34,549
Common.....		M			4,246			10,886	1,783
		\$			58,530			124,585	25,380
Fancy or ornamental brick.....		M		74	265				
		\$		3,791	23,858				
Sewer brick.....		M			722				82
		\$			12,490				2,809
Total.....		M	9,144	6,914	103,444	141,341	7,985	28,094	11,992
		\$	137,819	119,172	1,754,695	2,627,661	183,189	378,376	244,663
1931									
Soft mud process	Face.....	M 120	100		4,954			302	
		\$ 1,560	2,200		105,006			7,550	
Common.....		M 780	3,134		24,478	5,209	415	1,734	5,427
		\$ 10,660	42,671		373,130	76,685	5,451	22,280	88,477
Stiff mud process (wire cut)	Face.....	M 349	910	32,113	40,935	794	576	675	783
		\$ 9,970	25,069	766,988	873,334	17,577	20,233	12,328	26,848
Common.....		M 3,728	1,778	56,464	17,008	30	1,831	3,379	712
		\$ 54,573	26,311	841,868	249,880	360	18,095	3,267	11,110
Dry press	Face.....	M		2,894	13,991		27	2,797	458
		\$		74,970	300,614		720	28,937	18,116
Common.....		M		250	2,719			3,797	1,922
		\$		2,500	39,767			36,179	28,767
Fancy or ornamental brick.....		M		76					
		\$		3,944	16,829				
Sewer brick.....		M			1,946				307
		\$			33,321				10,371
Total.....		M	4,977	5,922	91,797	106,290	6,033	9,666	9,609
		\$	76,763	96,851	1,690,270	1,991,881	94,625	110,541	183,689

Table 274.—Production of Building Brick in Canada, 1924-1931

		Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or orna- mental brick	Sewer brick	Total
		Face	Common	Face	Common	Face	Common			
1924	M	10,831	50,079	80,565	124,556	35,203	12,794	755	2,690	317,473
	\$	185,248	746,044	1,842,224	1,880,631	761,572	168,043	98,460	40,775	5,722,997
1925	M	27,701	51,214	93,903	116,105	37,201	22,053	524	2,485	351,186
	\$	521,739	753,970	1,883,856	1,635,257	800,504	270,135	26,320	52,382	5,944,163
1926	M	28,235	78,158	101,028	94,046	30,423	19,450	462	6,546	358,348
	\$	556,573	1,145,490	2,146,362	1,624,055	651,236	260,598	24,057	117,194	6,525,565
1927	M	16,196	70,554	95,480	150,222	39,753	14,617	620	10,997	398,439
	\$	325,966	1,091,274	2,024,094	2,239,180	833,570	187,062	29,372	210,643	6,941,131
1928	M	17,532	93,280	101,717	144,404	36,587	24,294	599	2,888	421,391
	\$	349,847	1,328,981	2,247,472	2,182,307	748,301	337,096	28,763	59,010	7,281,777
1929	M	26,624	77,399	114,092	170,840	38,591	26,131	187	4,765	458,630
	\$	538,096	1,195,511	2,469,417	2,509,451	813,461	368,036	12,795	96,588	8,063,358
1930	M	11,350	56,487	99,284	105,225	29,434	16,915	539	804	319,838
	\$	247,220	861,805	2,135,871	1,480,965	604,197	208,495	27,646	15,299	5,581,591
1931	M	5,476	41,177	77,135	81,930	20,149	8,688	335	2,252	237,143
	\$	116,316	619,357	1,752,947	1,205,464	423,357	107,213	20,773	43,692	4,289,119
Total	M	143,945	518,348	763,295	987,328	267,341	144,942	3,821	33,428	2,862,358
	\$	2,841,005	7,742,432	16,562,213	14,757,319	5,636,198	1,966,681	268,189	635,582	30,289,611

Table 275.—Production of Paving Brick in Canada, 1922-1931

NOTE.—For years 1897 to 1921 see previous reports.

Year	Quantity	Value
	M	\$
1922	151	5,972
1923-25		
1926	122	5,015
1927	50	2,106
1928	338	4,464
1929	97	3,844
1930	9	297
1931	19	682

Table 276.—Production of Structural Tile in Canada, by Provinces, 1929-1931

Province	Hollow blocks (includ- ing fireproofing and load-bearing tile)		Roofing tile		Floor tile (quarries)	
	Tons	Value	No.	Value	Sq. ft.	Value
1929		\$		\$		\$
Nova Scotia	15,455	182,076				
New Brunswick	1,119	23,734				
Quebec	49,488	536,684				
Ontario	103,454	972,993	35,075	4,628	307,400	70,186
Manitoba	2,785	41,254				
Saskatchewan	13,257	111,072				
Alberta	20,812	195,503				
British Columbia	15,430	151,068				
Canada	221,806	2,214,384	35,075	4,628	307,490	70,186
1930						
Nova Scotia	9,378	107,998				
New Brunswick	600	8,888				
Quebec	39,769	484,605				
Ontario	85,155	791,474	3,056	356	179,047	56,054
Manitoba	1,335	17,754				
Saskatchewan	7,566	60,214			739	176
Alberta	13,123	111,807				
British Columbia	8,433	85,043				
Canada	165,359	1,667,783	3,056	356	179,786	56,230
1931						
Nova Scotia	7,372	86,632				
New Brunswick	1,776	16,706				
Quebec	41,685	477,720				
Ontario	41,774	346,079	6,935	720	107,418	31,395
Manitoba	1,278	15,703				
Saskatchewan	3,177	28,299			81	20
Alberta	5,360	42,276				
British Columbia	3,313	33,219				
Canada	105,635	1,046,634	6,935	720	107,499	31,415

Table 277.—Production of Sewer Pipe, Copings, Flue Linings, etc., in Canada, 1922-1931

(For the years 1888 to 1921 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	75,932	1,766,347	1927.....	77,262	1,475,875
1923.....	70,252	1,616,324	1928.....		1,723,644
1924.....	76,355	1,594,280	1929.....		2,005,887
1925.....	73,791	1,440,269	1930.....		1,721,815
1926.....	75,996	1,480,776	1931.....		1,508,803

Table 278.—Production of Drain Tile in Canada, 1922-1931

(For the years 1891 to 1921 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1922.....	14,728	407,386	1927.....	22,259	598,098
1923.....	10,599	323,314	1928.....	22,629	656,054
1924.....	15,137	409,369	1929.....	25,000	720,316
1925.....	14,552	401,503	1930.....	25,291	687,070
1926.....	14,258	396,018	1931.....	12,518	328,410

Table 279.—Production of Drain Tile and Sewer Pipe, in Canada, by Provinces, 1930 and 1931

Province	1930				1931			
	Drain tile		† Sewer pipe		Drain tile		† Sewer pipe	
	M	\$	Tons	\$	M	\$	Tons	\$
Nova Scotia.....	111	3,796		239,475	159	6,611		295,405
New Brunswick.....	5	193			3	127		
Quebec.....	835	28,763		195,981	696	24,864		168,054
Ontario.....	22,783	593,980		834,361	10,210	244,368		696,964
Manitoba.....	310	15,024			248	12,300		
Saskatchewan.....	25	1,000						
Alberta.....	58	3,785		335,033	65	1,721		227,305
British Columbia.....	1,164	40,529		116,965	1,147	38,419		121,075
Canada.....	25,291	687,070		1,721,815	12,518	328,410		1,508,803

†Includes copings, flue linings, etc.

Table 280.—Production of Pottery from Domestic Clays in Canada, 1922-1931

(For the years 1888 to 1921 see Mineral Production of Canada, 1928)

Year	Value	Year	Value
	\$		\$
1922.....	266,391	1927.....	307,057
1923.....	229,547	1928.....	356,093
1924.....	238,342	1929.....	323,194
1925.....	267,255	1930.....	294,866
1926.....	320,135	1931.....	257,125

Table 281.—Production of Kaolin in Canada, 1922-1931

NOTE.—For years 1912 to 1921 see previous reports.

Year	Tons	Value
		\$
1922.....	1,197	17,866
1923.....	163	2,369
1924-1926.....		
1927.....	24	120
1928.....	5	25
1929-1931.....		

Table 282.—Production of Fireclay in Canada, 1922-1931

(For years 1899 to 1921 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	Tons	\$		Tons	\$
1922.....	10,196	55,185	1927.....	5,070	35,961
1923.....	2,685	24,158	1928.....	5,123	35,284
1924.....	3,645	26,258	1929.....	5,041	35,226
1925.....	623	6,544	1930.....	2,870	25,975
1926.....	2,513	23,258	1931.....	1,233	14,857

Table 283.—Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1922-1931

(For the years 1907 to 1921 see Mineral Production of Canada, 1928)

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1922.....	6,705	251,776	65,588	1927.....	5,388	246,266	100,659
1923.....	6,122	295,037	81,345	1928.....	4,910	234,460	105,091
1924.....	4,327	209,256	51,273	1929.....	5,196	251,043	130,411
1925.....	6,197	305,332	36,567	1930.....	3,789	177,608	147,309
1926.....	4,195	192,276	54,064	1931.....	2,248	107,597	83,039

Table 284.—Production of Refractories, in Canada, from Domestic Clays, by Provinces, 1930 and 1931

Province	1930					1931				
	Fireclay		Firebrick		Fire-clay blocks and shapes	Fireclay		Firebrick		Fire-clay blocks and shapes
	Quantity	Value	Quantity	Value	Value	Quantity	Value	Quantity	Value	Value
	Tons	\$	M	\$	\$	Tons	\$	M	\$	\$
Nova Scotia.....	1,269	5,720			525	65	650	7	240	825
New Brunswick.....	46	1,814			552	48	1,930			535
Saskatchewan.....	504	3,920	504	28,001	118,122	484	3,915	415	24,568	63,603
Alberta.....	30	450	16	832				24	1,193	
British Columbia.....	1,021	14,071	3,269	148,775	28,110	636	8,362	1,802	81,596	18,076
Canada.....	2,870	25,975	3,789	177,608	147,309	1,233	14,857	2,248	107,597	83,039

Table 285.—World Production of China Clay

(Supplied by Imperial Institute)
(Long tons)

Country	1929	1930	1931	Country	1929	1930	1931
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom.....	826,046	716,319	570,524	Saxony—			
India.....	16,657	19,116	23,365	Crude.....	48,196	51,327	39,666
Unfederated Malay States..	741	410	396	Washed.....	64,268	47,487	35,618
Australia.....	6,082	4,771 (e)	3,215	Italy—			
FOREIGN COUNTRIES				Crude.....	14,688	12,308	4,258
Belgium (b).....	11,072	9,301	(a)	Washed and ground (f).....	7,220	4,839	(a)
Bulgaria.....	1,349	5,656		Kaolinic earth.....	16,300	10,035	(a)
Czechoslovakia (estimated)	450,000	400,000	400,000	Portugal.....	3,818	4,601	6,513
Denmark—				Roumania (c).....	7,376	6,666	4,854
Crude.....	21,341	29,406	35,200	Spain (d).....	2,034	800	900
Washed or pressed.....	5,000	7,700	8,100	Algeria.....	1,344	2,523	(a)
Dried.....			1,700	United States (including			
France.....	169,100	(a)	(a)	paper-clay).....	462,651	455,673	395,800
Germany—				Argentina.....		369	
Bavaria.....	376,953	366,712	327,520	China.....	786,000	778,000	772,000
Prussia.....	15,984	12,844	10,797	Japan (estimated).....	400,000	400,000	400,000
				Korea.....	8,586	8,134	(a)

(a) Information not available.

(b) Euriite and kaolin.

(c) Converted from cubic metres at the rate of 1 cu. metre=2 long tons.

(d) 3,350 and 2,100 cubic metres of kaolinic sand were also produced in quarries during 1929 and 1930 respectively.

(e) Excluding production of Victoria, which is not available, but amounted to 1,717 long tons in 1929.

(f) Derived from crude and stocks.

IMPORTED CLAY PRODUCTS

In continuance of the custom followed in previous mineral production reports, a short review of the imported-clay products industry is given herewith.

Manufactures in Canada from imported clays in 1930 amounted in value to \$2,978,143, of which amount the province of Quebec contributed \$679,278 and Ontario, \$2,298,865. This production was 12 per cent under the record of \$3,373,038 established for the industry in 1929. Each year from 1926 until 1929 the industry attained a new high production value, the annual rate of increase amounting to 2 per cent in 1927, 18 per cent in 1928, and 37 per cent in 1929. The 1930 production, valued at \$2,978,143, marked the first decline in five years, this decrease continued into 1931 in which year the output was valued at \$2,455,738. Among the products manufactured from imported clays were porcelain insulators, firebrick, and other miscellaneous manufactures such as pottery, sanitary earthenware, sewer pipe, floor tile, etc.

Data on this industry for 1931 covers the operation of 14 plants, 10 of which were located in the province of Ontario and 4 in Quebec. These concerns employed a working capital of \$4,320,382, afforded monthly employment to an average of 832 persons who received \$958,900 in salaries and wages. Purchased materials cost \$695,706 and the value added by manufacturing processes was \$1,760,032.

At St. Johns, Quebec, two plants produced sanitary ware from imported ball and china clays, while a third firm manufactured refractory products and vitrified sewer pipe. Refractory products were also made by one firm at Montreal, one at Toronto, one at Mimico, one at Port Robinson and one at Hamilton. Earthenware was produced at Hamilton, Ontario. Porcelain insulators were manufactured in Ontario at Georgetown, Hamilton, Niagara Falls and Peterborough. Artware was produced at Oshawa and a plant at Kingston produced ceramic floor tile.

Table 286.—Capital Employed in the Imported-Clay Products Industry in Canada, 1930 and 1931

	1930	1931
Capital employed as represented by:	\$	\$
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	2,573,608	2,819,285
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	655,241	391,375
†(c) Inventory value of finished products on hand.....	308,095	308,095
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	871,116	801,627
Total.....	4,099,965	4,320,382

†Included with item (b) in 1930.

Table 287.—Employees, Salaries and Wages in the Imported-Clay Products Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees					Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Male	Female				
1930						\$	\$	\$
Quebec.....	27	3	219	6	255	67,024	257,933	324,957
Ontario.....	43	21	449	73	586	180,538	546,791	727,329
Canada.....	70	24	668	79	841	247,562	804,724	1,052,286
1931								
Quebec.....	24	3	242	6	275	66,013	283,411	349,424
Ontario.....	45	14	420	78	557	160,754	448,722	609,476
Canada.....	69	17	662	84	832	226,767	732,133	958,900

*See note page 35.

LIME

Statistics obtained during the census of 1871 show 1,010 lime kilns in operation in Canada. These kilns were located in Nova Scotia, New Brunswick, Quebec and Ontario. Capital invested in plant and equipment as recorded during that year was \$128,508, and employees numbered 2,042, earning \$157,943; the value of lime produced was \$502,156. A substantial growth was shown in this industry according to data obtained ten years later; active kilns had increased to 1,274 with a corresponding advance in capital investment to a total of \$309,354. Employment in 1881 was furnished 2,537 wage-earners who received \$203,631 and the value of lime produced was \$707,132.

Lime production in Canada during 1931 amounted to 344,785 tons valued at \$2,764,415 as compared with 490,802 tons valued at \$4,038,698 in 1930.

Canadian producers received an average of \$7.38 per ton for quicklime and \$10.71 for hydrated lime in 1931 as against \$7.68 for quicklime and \$11.30 per ton for hydrated lime during 1930.

Lime used in chemical or metallurgical processes employed in the pulp and paper industry, smelting industry, iron and steel mills, sugar refineries and other industries amounted to 231,837 tons or 67.2 per cent of the total lime production. Of this tonnage the pulp and paper industry consumed 79,893 tons valued at \$569,258; this represents 34.5 per cent of the lime used for chemical purposes.

A bulletin issued by the Department of Mines, Ottawa, gives the following information regarding lime:—

"Lime up to 20 pounds per ton of ore is used in the selective flotation of copper, lead, molybdenite and graphite, and in the cyanide process of extracting gold and silver from their ores from 3 to 5 pounds of lime per ton of ore is added to the solution. The lime for these uses must be made from a high-calcium limestone; for use in cyanide mills it must be absolutely free from charcoal and coke. In the pulp and paper industry 200 pounds of lime is required if the milk-of-lime system is used; a further 130 pounds of lime is needed in bleaching each ton of sulphite pulp. The sulphate pulp process requires 500 pounds of lime per ton of pulp produced; for the making of a ton of bleached soda pulp about 600 pounds of lime is required. In the two latter processes it is possible to recover most of the lime for further use. Rag paper requires from 120 to 250 pounds of lime per ton of rags, depending on the kind of rag used. Milk-of-lime systems require a lime made from a pure dolomite and it must be free from dark-coloured specks; the lime is used either as quicklime or hydrate. A particularly pure limestone is required for the making of lime used in sugar refining, it should possess less than 1 per cent silica and 1 per cent magnesia. Lime used in removing of hair from hides at tanneries should be low in content of iron oxides and magnesia. It should be free from grit and preferably slow in settling. Bleaching powder is simply hydrated lime saturated with chlorine gas, the lime for this purpose must be white and high-calcium in

composition and the magnesia content less than $1\frac{1}{2}$ per cent, iron oxide should be low. For the commercial production of caustic soda a purer lime than that used in the pulp industry should be employed. Lime enters into nearly every common process of water treatment. A pure high-calcium lime, practically free from iron, is necessary for bleaching and dyeing in the textile industry. Lime is also used in the hardwood distillation industry for the production of calcium acetate and in the sand-lime brick industry in the manufacture of sand-lime brick."

A Canadian Order-in-Council dated October 28, 1931, fixed the value for duty of lime (slaked or hydrated) dutiable under tariff item 293, at \$3.88 per ton at the point of production. Accordingly, "dumping" or special duty becomes leviable whenever the export or actual selling price of such lime to an importer in Canada is less than the value so fixed. Lime shipped on consignment without sale prior to shipment, so as to evade the payment of special duty, will be subject to the same special duty as if the goods had been sold prior to shipment.

Table 288.—Capital Employed in the Lime Industry in Canada, by Provinces, 1930 and 1931

Province	1930				1931				
	Capital employed as represented by				Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	†\$	\$	\$
New Brunswick*	137,000	30,831	27,500	195,331	143,000	17,900	9,424	26,200	196,524
Quebec	1,535,263	167,353	231,132	1,933,748	1,712,640	134,375	24,458	207,726	2,079,199
Ontario	3,097,960	146,006	951,706	4,195,672	3,416,926	72,123	36,843	77,598	3,603,490
Manitoba	619,231	52,864	1,183	673,278	612,513	15,850	1,922	645	630,930
Alberta	155,909	28,206	33,131	217,246	156,278	7,505	2,304	32,034	198,121
British Columbia	1,442,562	69,070	89,972	1,601,604	447,037	37,498	12,859	84,332	581,726
Canada	6,987,925	494,330	1,334,624	8,816,879	6,488,394	285,251	87,810	428,535	7,289,990

* Includes data for 2 firms in Nova Scotia.

† Included with cost of supplies and stocks on hand in 1930.

Table 289.—Employees, Salaries and Wages in the Lime Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1930						
New Brunswick†	8	100	108	11,272	87,367	98,639
Quebec	18	284	302	32,238	226,919	259,157
Ontario	36	341	377	56,067	357,847	413,914
Manitoba	8	110	118	13,079	75,850	88,929
Alberta	3	21	24	5,500	27,190	32,690
British Columbia	18	139	157	30,369	164,080	194,449
Canada	91	995	1,086	148,525	939,253	1,087,778
1931						
New Brunswick†	7	84	91	10,700	72,248	82,948
Quebec	17	203	220	29,114	181,493	210,607
Ontario	27	228	255	40,388	216,234	256,622
Manitoba	7	72	79	10,820	61,937	72,757
Alberta	3	14	17	4,800	14,907	19,707
British Columbia	17	120	137	25,703	117,504	143,207
Canada	78	721	799	121,525	664,343	785,868

* See note page 35.

† Includes data for 2 firms in Nova Scotia.

Table 290.—Production of Lime in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	314,054	3,165,005	1927.....	444,753	3,923,388
1923.....	351,236	3,266,608	1928.....	508,889	4,534,568
1924.....	319,793	3,178,541	1929.....	674,087	5,908,610
1925.....	358,979	3,387,652	1930.....	490,802	4,038,698
1926.....	413,901	3,781,484	1931.....	344,785	2,764,415

Table 291.—Production of Lime in Canada, 1930 and 1931, Showing Purposes for Which Sold or Used

Purposes for which sold or used	1930				1931			
	Quicklime		Hydrated lime		Quicklime		Hydrated lime	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building Trades—								
Finishing lime.....	13,319	145,073	38,198	506,301	6,496	53,335	28,724	359,915
Masons' lime.....	25,773	235,421	11,283	114,750	29,874	283,241	9,587	96,832
Sand-lime brick.....	11,543	89,888			11,419	80,666	358	3,659
Agricultural.....	250	2,750	1,249	10,921	420	4,830	1,312	11,539
Chemical—								
Smelters.....	2,177	13,467	3,676	27,588	3,609	28,635	2,605	22,691
Iron and steel mills.....	33,215	135,766	245	2,573	21,155	101,425	3	37
Cyanide mills.....	13,217	107,955			18,135	125,977	25	263
Pulp and paper mills.....	82,402	611,805	9,222	83,179	66,913	448,903	12,980	120,355
Glass works.....	4,033	32,911			6,129	48,407		
Sugar refineries.....	9,826	75,634	16	200	11,454	107,828	65	925
Tanneries.....	1,952	16,757	131	1,049	1,859	14,847	130	1,077
Other chemical works.....	188,515	1,460,871	2,816	26,357	84,528	593,412	2,247	22,537
Dealers (uses unspecified).....	19,041	189,832	5,419	47,055	8,719	85,620	5,309	42,213
Other consumers.....	11,658	85,009	1,626	15,856	8,798	87,858	1,932	17,388
Total.....	416,921	3,203,139	73,881	835,559	279,508	2,064,984	65,277	699,431

Table 292.—Production of Lime in Canada, by Provinces, 1929-1931

Province	Quicklime		Hydrated Lime		Total		
	Sold or used		Sold or used		Sold or used		
	Tons	Value	Tons	Value	Tons	Value	
		\$		\$		\$	
Nova Scotia.....	1929	41,001	143,787	1,000	10,400	42,001	154,187
	1930	30,462	106,730	652	6,520	31,114	113,250
	1931	17,790	73,018	640	6,400	18,430	79,418
New Brunswick.....	1929	11,766	135,981	3,752	38,572	15,518	174,553
	1930	9,947	104,159	2,574	31,145	12,521	135,304
	1931	5,161	61,729	6,080	65,325	11,241	127,054
Quebec.....	1929	157,414	1,183,148	9,478	81,046	166,892	1,264,194
	1930	117,358	874,077	11,992	93,573	129,350	967,650
	1931	101,186	720,049	10,310	84,169	111,496	804,218
Ontario.....	1929	314,243	2,624,284	55,915	740,127	370,158	3,364,411
	1930	209,340	1,673,409	42,726	504,178	252,066	2,177,587
	1931	113,376	842,274	34,284	379,996	147,660	1,222,270
Manitoba.....	1929	22,178	186,377	10,068	174,727	32,246	361,104
	1930	17,587	143,955	6,511	116,370	24,098	260,325
	1931	16,575	126,789	4,439	80,612	21,014	207,401
Alberta.....	1929	7,681	79,569	.....	.....	7,681	79,569
	1930	5,123	49,330	13	195	5,136	49,525
	1931	5,056	46,047	62	738	5,118	46,785
British Columbia.....	1929	26,300	355,013	13,291	155,579	39,591	510,592
	1930	27,104	251,479	9,413	83,578	36,517	335,057
	1931	20,364	195,078	9,462	82,191	29,826	277,269
Canada.....	1929	580,583	4,708,159	93,504	1,209,451	674,087	5,908,610
	1930	416,921	3,203,139	73,881	835,559	490,802	4,038,698
	1931	279,508	2,064,984	65,277	699,431	344,785	2,764,415

Table 293.—Imports into Canada and Exports of Lime, 1929-1931

Item	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Imports.....	4,448	49,395	2,096	28,107	568	10,561
Exports.....	24,238	428,209	22,864	444,728	14,425	283,459

SAND AND GRAVEL

Production statistics for the sand and gravel industry in Canada were first collected in 1912. Prior to that year the only data available consist of Customs' records of sand and gravel exported. In 1886 exportations amounted to 124,865 tons; twenty-four years later exports had risen to 624,824 tons appraised at \$407,974. During 1912, production was valued at \$1,512,099 and wages paid to the 875 pit employees totalled \$527,425. It was not until 1916 that tonnage statements were obtained from the operators in this industry; the total for that year amounted to 8,156,207 tons at \$1,838,320. Since 1918, the annual production has exceeded the 10-million ton mark. The highest market valuation per ton for this material was received in 1920, when 11,530,795 tons were sold for \$4,201,067. During that year, the 186 producers employed 1,546 men whose total earnings were \$1,343,212.

Sand and gravel production in Canada during 1931 amounted to 21,748,586 tons valued at \$6,651,165 as compared with the high record production of 28,547,511 tons worth \$8,344,913 in 1930. This decrease reflects the more or less general industrial depression existing throughout the year, especially in the building trades.

An important development in this industry during 1931 was the construction of an elaborate and modern sand washing and grading plant by the Standard Lime Company on their property at Ste. Emelie, Quebec. There is a marked tendency at the present time on the part of sand-pit operators to adopt mechanical means to reduce the cost of loading to a minimum; there is also an increase in the installation of sand-grading equipment.

Imports of sand and gravel into Canada during 1931 totalled 155,482 tons valued at \$139,935 as compared with 185,362 tons worth \$167,642 in 1930. In addition silica sand imported for glass and carborundum manufacture and for use in steel foundries amounted to 107,712 tons valued at \$235,191, of these, 84,483 tons worth \$194,731 came from the United States and 23,206 tons at \$40,114 from Belgium.

Table 294.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1930 and 1931

Province	1930				1931				
	Capital employed as represented by				Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable etc.	Total
	\$	\$	\$	\$	\$	\$	†\$	\$	\$
Quebec.....	370,622	19,750	8,758	399,130	510,384	15,000	10,800	63,275	599,459
Ontario.....	4,705,260	69,799	283,377	5,058,436	4,923,834	57,840	103,906	685,551	5,771,131
Manitoba.....	591,750	57,571	169,785	819,106	598,033	3,177	52,346	243,895	897,451
Saskatchewan.....	75,000	2,500	.....	77,500	84,000	5,000	.....	35,000	124,000
British Columbia.....	1,130,422	15,561	50,062	1,196,045	1,189,082	2,977	6,455	44,686	1,243,200
Canada.....	6,873,054	165,181	511,982	7,550,217	7,305,333	83,994	173,507	1,072,407	8,635,241

†In 1930 included under cost of supplies and stocks on hand.

Table 295.—Employees, Salaries and Wages in the Sand and Gravel Industry by Provinces, 1930 and 1931

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1930				\$	\$	\$
Nova Scotia.....		285	285		65,559	65,559
New Brunswick.....		105	105		14,063	14,063
Quebec.....	16	2,866	2,882	22,337	907,649	929,986
Ontario.....	50	911	961	103,404	671,656	775,060
Manitoba.....	10	290	300	21,511	142,928	164,439
Saskatchewan.....	4	477	481	7,500	185,601	193,101
Alberta.....		309	309		66,069	66,069
British Columbia.....	20	258	278	40,882	258,848	299,730
Canada.....	100	5,501	5,601	195,634	2,312,493	2,508,037
1931						
Nova Scotia.....		199	199		165,815	165,815
New Brunswick.....		10	10		11,318	11,318
Quebec.....	18	1,540	1,558	29,792	1,069,851	1,129,643
Ontario.....	78	577	655	165,217	639,103	804,320
Manitoba.....	11	122	133	22,444	152,879	175,323
Saskatchewan.....	3	325	328	4,000	198,896	202,896
Alberta.....		149	149		127,301	127,301
British Columbia.....	20	172	192	36,028	225,367	261,395
Canada.....	130	3,094	3,224	257,481	2,620,530	2,878,011

*See note, page 35.

Table 296.—Production of Sand and Gravel in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	11,666,374	3,502,935	1927.....	22,952,819	6,055,601
1923.....	12,752,515	3,016,518	1928.....	28,102,917	5,809,431
1924.....	11,603,500	3,181,083	1929.....	27,846,945	7,317,814
1925.....	11,018,647	3,220,410	1930.....	28,547,511	8,344,913
1926.....	17,112,798	4,941,434	1931.....	21,748,586	6,651,165

Table 297.—Production in Canada, Imports and Exports of Sand and Gravel, 1929-1931

Kind	1929			1930			1931		
	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value
	Tons	Tons	\$	Tons	Tons	\$	Tons	Tons	\$
PRODUCTION—									
Sand—									
Moulding sand.....	7,659	56,798	50,308	202	43,440	31,768	30	13,851	,940
Building sand and sand for concrete, roadwork, etc.....	2,207,745	501,544	1,181,261	3,036,318	406,867	1,399,044	1,671,798	1,517,450	1,069,210
Core sand.....	3,000	8,015	10,168	.....	3,968	5,090	.....	2,158	3,237
Other sand (includ- ing blast and en- gine sands).....	.....	324,235	63,097	.....	69,484	16,162	84,936	48,301	43,123
Sand and Gravel—									
Sand and gravel for railway ballast....	23,041	11,175,050	1,257,424	192,903	6,559,517	961,462	1,296	3,592,155	459,531
Sand and gravel for concrete, roads, etc.....	3,247,771	9,307,323	4,087,132	4,892,140	12,517,450	5,569,202	5,551,284	8,800,999	4,784,298
Crushed gravel.....	785,618	199,146	668,424	452,785	372,437	362,185	326,767	137,561	281,826
Total.....	6,274,834	21,572,111	7,317,814	8,574,348	18,559,222	8,344,913	7,636,111	14,112,475	6,651,165
IMPORTS—			\$			\$			\$
Sand, silica for glass and carborundum manufacture, etc....	233,967	490,558	.....	164,349	352,796	.....	107,712	235,19	.....
Sand and gravel, n.o.p.	269,426	216,918	.....	185,362	167,642	.....	155,482	139,935	.....
Total.....	503,393	707,476	.....	349,711	520,438	.....	263,194	375,126	.....
EXPORTS.....	1,903,312	441,798	.....	2,586,461	465,292	.....	485,813	146,060	.....

Table 298.—Production of Sand and Gravel in Canada, by Railway Operators, 1929-1931

Kind	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Sand—						
Moulding sand.....	425	225	.....	.....	.....	.....
Building sand and sand for concrete, roads, etc.....	7,817	3,082	2,649	233	358,926	33,995
Other sand (including blast, core and engine sands).....	301,653	50,562	58,056	8,396	31,425	5,162
Sand and Gravel—						
Sand and gravel for railway ballast.....	10,534,345	1,236,364	6,133,237	807,174	3,591,925	459,173
Sand and gravel for concrete, roads, etc.....	664,773	68,161	1,268,427	197,782	214,721	41,120
Crushed gravel.....	.....	.....	252,176	20,431	22,349	1,656
Total.....	11,509,013	1,358,394	7,714,545	1,031,016	4,219,316	541,106

Table 299.—Production of Sand and Gravel in Canada, by Operators Other than Railways, 1929-1931

Kind	1929			1930			1931		
	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
	Tons	Tons	\$	Tons	Tons	\$	Tons	Tons	\$
Sand—									
Moulding sand.....	7,659	56,373	50,083	202	43,440	31,768	30	13,851	9,940
Building sand and sand for concrete, roads, etc.....	2,207,745	493,727	1,178,179	3,036,318	404,218	1,398,811	1,671,798	1,158,524	1,035,215
Core sand.....	3,000	8,015	10,168	.....	3,968	5,090	.....	2,158	3,237
Other sand (including blast, and engine sands).....	.....	22,582	12,535	.....	11,428	7,766	84,936	16,876	37,961
Sand and Gravel—									
Sand and gravel for railway ballast.....	23,041	640,705	21,060	192,903	426,280	154,288	1,296	230	358
Sand and gravel for concrete, roads, etc.	3,247,771	8,642,550	4,018,971	4,892,140	11,249,023	5,371,420	5,551,284	8,586,278	4,743,178
Crushed gravel.....	785,618	199,146	668,424	452,785	120,261	341,754	326,767	115,212	280,170
Total.....	6,274,834	10,063,098	5,959,426	8,574,348	12,258,618	7,310,897	7,636,111	9,893,129	6,110,959

Table 300.—Production of Sand and Gravel in Canada, by Provinces, 1929-1931

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
1929								
Sand—								
Moulding sand..... tons	60		170	62,738	1,028			461
\$	150		106	48,047	895			1,110
Building sand and sand for concrete, roadwork, etc..... tons	102		1,084,178	1,454,023	60,499	3,244	36,902	70,341
\$	169		419,798	703,067	23,538	1,350	16,154	17,185
Core sand..... tons	3,176			7,362	477			
\$	2,858			6,826	484			
Other sand (including blast sand, engine sand, etc.)..... tons		1,634	25,444	23,694	155,953	1,175	6,851	109,484
\$		574	8,152	8,308	24,771	279	1,290	19,723
Sand and Gravel—								
Sand and gravel for railway ballast..... tons	221,887	498,451	1,146,095	2,785,954	1,278,089	2,642,881	1,097,037	1,527,697
\$	31,235	32,478	226,396	281,806	180,287	293,730	91,349	120,143
Sand and gravel for concrete, roads, etc..... tons	68,557	19,271	3,932,494	6,353,889	163,151	795,379	550,257	672,096
\$	70,729	12,313	872,822	1,968,918	36,027	352,287	299,048	474,088
Crushed gravel..... tons	38,817	6,501	14,850	670,908	122,888	54,000	30,883	45,917
\$	46,227	802	7,425	445,407	56,428	40,000	39,252	32,883
Total..... tons	332,599	525,857	6,203,231	11,358,568	1,782,085	3,496,679	1,721,930	2,425,996
 \$	151,368	46,167	1,534,699	3,462,379	322,430	687,646	447,993	665,132
1930								
Sand—								
Moulding sand..... tons	30	9,450		32,551	700			911
\$	75	7,000		22,845	1,083			765
Building sand and sand for concrete, roadwork, etc..... tons	27		1,337,072	1,922,749	29,182	2,700	15,560	135,895
\$	14		474,263	842,771	10,465	1,200	6,496	63,835
Core sand..... tons				3,846	122			
\$				5,000	90			
Other sand (including blast sand, engine sand, etc.)..... tons	3,849	803	3,375	36,689	1,323	13,892		9,553
\$	3,464	227	694	6,146	196	2,100		3,335
Sand and Gravel—								
Sand and gravel for railway ballast..... tons	191,943	328,881	855,597	1,729,855	64,708	2,309,412	908,523	363,501
\$	33,594	31,319	187,161	201,512	13,758	306,647	149,644	37,827
Sand and gravel for concrete, roads, etc..... tons	329,834	18,417	4,317,408	7,755,385	1,033,351	1,293,795	702,906	1,958,490
\$	273,260	2,757	1,083,008	2,469,117	361,116	405,832	277,081	697,031
Crushed gravel..... tons			68,355	546,007	123,717	60,750		26,393
\$			5,564	236,439	67,236	36,000		16,946
Total..... tons	525,683	357,551	6,581,807	12,027,082	1,253,103	3,680,553	1,626,989	2,494,743
 \$	310,407	41,303	1,750,690	3,783,830	453,944	751,779	433,221	819,739
1931								
Sand—								
Moulding sand..... tons	30			13,588	125			138
\$	75			9,437	188			240
Building sand and sand for concrete, roadwork, etc..... tons	3,000		1,474,242	1,336,353	50,217	35,263	145,216	144,957
\$	750		450,798	533,250	11,356	4,039	15,357	53,660
Core sand..... tons				1,850	308			
\$				2,775	462			
Other sand (including blast sand, engine sand, etc.)..... tons	880		11,893	77,194	5,105	17,820	3,734	16,611
\$	792		15,515	19,156	1,729	2,411	558	2,962
Sand and Gravel—								
Sand and gravel for railway ballast..... tons	62,554	154,056	1,139,845	644,929	37,407	770,835	251,088	432,734
\$	8,578	13,816	152,504	83,181	5,023	101,583	45,997	48,849
Sand and gravel for concrete, roads, etc..... tons	337,394	29,416	4,923,235	5,183,126	605,185	524,176	550,950	2,108,801
\$	188,562	4,332	1,243,991	1,792,781	246,718	258,674	251,704	797,535
Crushed gravel..... tons			108,746	207,977	83,639	40,500		23,463
\$			90,151	121,837	28,702	30,000		11,076
Total..... tons	403,858	183,475	7,657,964	7,465,017	871,986	1,388,594	1,050,988	2,726,704
 \$	193,757	18,149	1,952,959	2,562,477	294,178	396,707	313,616	914,322

SAND-LIME BRICK

On account of its association with other building materials, data regarding the production of sand-lime brick are included in this report. Statistics relating to sand-lime brick are not included in the totals for structural materials industries as both the sand and lime used have been so recorded; production of sand-lime brick is regarded as a manufacturing operation and therefore is shown in the report on the *Manufactures of the Non-Metallic Minerals*, issued annually by the Bureau.

Production from the sand-lime brick industry in Canada was valued at \$540,390 in 1931. This was the lowest output reported for the industry since the \$455,005 of 1919, and is comparable with totals of \$671,301 in 1930 and \$953,726 in 1929.

Only 11 plants manufactured sand-lime brick in Canada during 1931. Of these, 5 were located in Ontario, 3 in Manitoba, 2 in Quebec, and 1 in British Columbia. Capital employed was reported at \$1,490,453, the number of workers was 183, and payments for salaries and wages, \$207,570. Materials purchased for manufacturing cost \$191,572 at the works and the value added by manufacturing was \$348,818.

The 5 factories in Ontario reported capital at \$941,461, employees at 121, salaries and wages at \$144,119, cost of materials at \$139,445, and the gross value of products at \$383,796.

Production of sand-lime brick totalled 46,003 M valued at \$469,783 at the works as compared with 52,770 M at \$567,022 in 1930.

Table 301.—Sand-Lime Brick Manufactured in Canada, by Provinces, 1929-1931

Province	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
	M	\$	M	\$	M	\$
Quebec.....	8,745	114,617	9,025	111,930	9,709	129,113
Ontario.....	60,400	708,584	41,576	424,178	34,400	313,189
Manitoba.....	7,150	99,527	1,720	23,730	1,226	17,457
Alberta.....	2,066	30,998				
British Columbia.....			449	7,184	668	10,024
Total.....	78,361	953,726	52,770	567,022	46,003	469,783

SLATE

Slate deposits located along the south shore of the St. Lawrence river in Quebec, were operated for the first time in 1854. Production from these deposits reached a maximum in point of value in 1889 when 6,935 tons valued at \$119,160 were shipped. These shipments consisted of roofing slates, mantels and slabs. Quarrying operations were carried on at the Quebec deposits up to 1923, in which year 1,836 tons of crushed green and red slate were shipped for use in the manufacture of roofing material. No production from these deposits has been recorded since that date.

During 1908, a slate quarry was operated at Jarvis Inlet, British Columbia and in 1931 a quarry at Leechtown, Victoria Mining Division, British Columbia, shipped 250 tons of slate to companies manufacturing or selling roofing materials.

Table 302.—Production of Slate in Canada, 1922-1931

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	1,899	14,871	1930.....	150	3,000
1923.....	1,836	17,289	1931.....	250	5,000
1924-1929.....					

NOTE.—For years 1886 to 1921 see previous reports.

Table 303.—Imports of Slate into Canada, 1929-1931

	1929		1930		1931	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Roofing.....Squares	9,504	123,793	4,349	59,411	3,777	42,523
School-writing.....		96,296		91,355		78,371
Pencils.....		9,398		6,506		3,309
Mantels and manufactures of slate, n.o.p.....		67,151		48,706		30,805
Total.....		296,638		205,978		155,008

THE STONE INDUSTRY IN CANADA

Including (1) The Stone Quarrying Industry and (2) The Monumental and Ornamental Stone Industry

(1) PRIMARY PRODUCTION—The Stone Quarrying Industry

Statistics of the stone industry as set forth in the general tables of this report have been confined to quarrying operations and to the production of dressed stone when this operation is carried on in conjunction with the quarrying. The kinds of stone quarried in Canada include granite (trap rock, syenite and other igneous rock), limestone, marble, sandstone, and slate. Stone of almost every known variety occurs in Canada; rocks of the igneous areas of British Columbia, Manitoba, Ontario, Quebec and the Maritime Provinces exhibit a wide range of physical characteristics, some varieties being especially noted for their richness of colour and beauty of crystallization. The sedimentary rocks including limestones, sandstones and marbles are widely distributed throughout Canada. The products from quarries operating in these formations not only yield high class structural and decorative materials but provide the chemical and other allied industries with many of their growing requirements. In 1931 granite was produced in Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia; limestone in all the provinces with the exception of Prince Edward Island and Saskatchewan; marble in Quebec, Ontario, Manitoba and British Columbia; sandstone in Nova Scotia, New Brunswick, Quebec, Ontario, Alberta and British Columbia; the last named province also reported a small output of slate. The stone production of the province of Quebec during 1931 comprised 51 per cent of the quantity and 53 per cent of the value of the total Canadian stone production. The bulk of the limestone came from the quarries of St. Marc des Carrières and St. François de Sales, the major output of Quebec limestone being used in the form of crushed stone. As in past years the producers of Quebec granite operated in the districts of Stanstead, St. Sébastien and Scotstown. The handsome Sun Life Building in Montreal constructed entirely of Stanstead granite was completed in the spring of 1931. Among other outstanding buildings using Quebec granite, which were constructed or in course of construction during 1931, are the St. Joseph Oratory in Montreal, built of granite from the quarry of the Silver Granite Company; the National Research Building, Ottawa, and the addition (in part) to the Parliament Buildings, Quebec. Practically all of the marble for interior decoration quarried in Quebec is produced in the Philipsburg plant of the Wallace Sandstone Company. The notable increase in sandstone production in Quebec during 1931 was due almost wholly to the large volume of stone produced in the excavation of the tail race of the Beauharnois power plant. In Ontario green, pink, brown and white marbles were produced at Bancroft; marble from this area was used for interior decoration of the new government building in Toronto. The popularity of the mottled limestone quarried at Garson, Manitoba, and known as Tyndall stone is continually growing. Shipments of this stone in 1931 were made to points in both Eastern and Western Canada; this product is now recognized as one of the world's finest building stones. In British Columbia, granites quarried on Nelson Island and described as light grey and blue grey were sold not only in this province but shipped to points in Alberta, Saskatchewan and Manitoba; this stone was also marketed in the states of Oregon, Washington and Idaho.

Table 304.—Capital Employed in the Stone Quarrying Industry in Canada, by Provinces, 1930 and 1931

Province	1930				1931				
	Capital employed as represented by				Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand stocks in process, fuel, etc.	Inventory value of finished products on hand †	Operating capital including cash, bills and accounts receivable etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	1,199,358	31,223	16,531	1,247,112	1,325,207	35,645	11,047	45,141	1,417,040
New Brunswick.....	250,728	46,586	54,573	351,887	338,028	34,080	33,193	72,139	477,410
Quebec.....	4,401,095	513,786	1,085,360	6,000,241	4,994,935	407,495	238,845	1,165,574	6,806,849
Ontario.....	9,503,183	443,385	2,520,687	12,467,255	7,194,459	278,574	134,849	484,956	8,092,838
Manitoba.....	528,832	81,452	201,815	812,099	481,262	56,862	23,105	210,410	771,639
Alberta.....					2,000				2,000
British Columbia.....	1,089,045	87,922	140,827	1,317,794	1,029,485	54,239	25,118	184,148	1,292,990
Canada.....	16,972,241	1,204,354	4,019,793	22,196,388	15,365,376	866,895	466,157	2,162,368	18,860,796

†In 1930 included under cost of supplies and stocks on hand.

Table 305.—Employees, Salaries and Wages in the Stone Industry in Canada, by Provinces, 1930 and 1931

Province	*Average number of employees			Salaries and Wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
1930						
Nova Scotia.....	7	248	255	11,375	166,229	177,604
New Brunswick.....	16	194	210	36,472	139,461	175,933
Quebec.....	139	3,117	3,256	259,260	2,406,397	2,665,657
Ontario.....	124	1,720	1,844	288,428	1,416,077	1,704,505
Manitoba.....	21	306	327	58,666	314,840	373,506
Alberta.....		7	7		3,400	3,400
British Columbia.....	24	269	293	63,162	378,444	441,606
Canada.....	331	5,861	6,192	717,363	4,824,848	5,542,211
1931						
Nova Scotia.....	10	131	141	15,126	118,646	133,772
New Brunswick.....	15	190	205	31,510	165,354	196,864
Quebec.....	165	2,310	2,475	282,057	2,184,221	2,466,278
Ontario.....	97	856	953	207,448	811,259	1,018,707
Manitoba.....	22	174	196	62,699	206,197	268,896
Alberta.....		2	2		2,576	2,576
British Columbia.....	20	206	226	61,039	322,567	383,606
Canada.....	329	3,869	4,198	659,879	3,810,820	4,470,699

*See note page 35.

Table 306.—Production of Granite in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	457,925	1,486,250	1927.....	730,049	1,383,557
1923.....	398,432	1,159,303	1928.....	1,195,810	2,366,946
1924.....	419,971	1,013,345	1929.....	1,728,165	3,080,815
1925.....	971,718	2,014,535	1930.....	1,851,132	3,379,951
1926.....	1,064,423	1,574,627	1931.....	1,190,887	2,763,050

Table 307.—Production of Limestone and Sandstone in Canada, 1922-1931

(For the years 1886 to 1921 see Mineral Production of Canada, 1928)

Year	Limestone		Sandstone		Year	Limestone		Sandstone	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1922.....	3,152,124	4,175,941	25,221	80,908	1927.....	6,438,379	7,145,917	132,799	232,793
1923.....	3,687,663	4,475,921	22,766	66,547	1928.....	6,949,420	7,267,437	100,951	223,236
1924.....	4,249,061	4,831,684	94,603	240,273	1929.....	7,720,840	8,172,681	159,407	398,974
1925.....	4,643,853	5,049,563	87,502	145,757	1930.....	7,732,675	8,075,616	384,610	769,060
1926.....	5,283,745	5,657,328	44,127	112,347	1931.....	6,262,430	6,305,538	924,101	1,332,883

Table 308.—Production of Marble in Canada, 1922-1931

(For the years 1886 to 1921 see Annual Report Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	1,912	231,894	1927.....	5,209	503,037
1923.....	2,473	201,518	1928.....	7,753	414,682
1924.....	4,379	322,455	1929.....	14,012	414,062
1925.....	3,046	254,922	1930.....	26,089	809,582
1926.....	5,295	521,572	1931.....	20,442	668,713

Table 309.—Production of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1930

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	8,900	750	28,662	22,104	28,402	2,467		91,285
\$	94,250	3,375	167,135	134,381	192,318	13,835		665,294
Dressed..... tons	20	784	51,116	12,971	12,892	117	4,019	81,919
\$	1,000	39,020	2,277,989	184,269	787,934	4,500	284,772	3,579,484
Monumental and ornamental—								
Rough..... tons	325	668	6,416	56	91		933	8,489
\$	6,650	15,470	87,679	641	709		10,641	121,790
Dressed..... tons	410	485	880	73			407	2,255
\$	19,700	34,672	33,487	2,770			24,452	115,081
Flagstone..... tons			42	946				988
\$			42	10,358				10,400
Curbstone..... tons		979	30,537	316	206		101	32,133
\$		16,060	164,736	5,845	206		1,050	187,897
Paving blocks..... tons		43	7,640	2,849			36	10,568
\$		540	59,523	23,606			525	84,194
Lining open-hearth furnaces..... tons					939			939
\$					1,643			1,643
Chemical—								
Flux in iron and steel plants.... tons	73,402			161,427	2,424	1,314		238,567
\$	71,102			119,920	3,733	2,628		197,383
Flux in smelters..... tons			821	117,330			26,321	144,472
\$			821	87,621			22,282	110,724
Glass factories..... tons						1,046		1,046
\$						1,569		1,569
Pulp and paper mills..... tons	5,099	21,719	68,975	40,038	13,506		16,108	165,445
\$	10,943	42,144	62,864	37,386	15,243		26,113	194,693
Sugar refineries..... tons		50		23,337	4,629	4,137		32,153
\$		300		16,336	5,778	7,239		29,653
Other chemical uses..... tons			1,337	3,436				4,773
\$			4,107	2,405				6,512
Whiting..... tons	72							72
\$	1,338							1,338
Asphalt..... tons			7,487	11,240				18,727
\$			23,684	49,851				73,535
Dusting coal mines..... tons						1,289		1,289
\$						5,800		5,800
Agricultural purposes..... tons	1,368	18,493	26,429	13,880			1,714	61,884
\$	5,162	55,397	67,833	43,191			10,171	181,754
Poultry grit..... tons				1,938			532	2,470
\$				11,264			5,404	16,668
Stucco dash..... tons			4,503	3,678			1,463	9,644
\$			26,312	23,676			13,160	63,148
Terazzo flooring..... tons	4,472			229				4,701
\$	4,918			1,145				6,063
Rubble and riprap..... tons		23,891	650,045	211,704	5,793		126,918	1,018,351
\$		20,141	453,570	110,384	7,066		115,288	706,449
(Concrete aggregate tons	10,000		1,304,074	800,847	33		150	2,115,104
\$	29,952		913,924	679,586	42		400	1,623,904
Crushed stone: Road metal..... tons	48,395	43,750	1,626,345	2,000,140	78,163		113,452	3,910,245
\$	75,301	57,750	1,406,317	1,700,828	70,807		123,932	3,434,935
(Railroad ballast..... tons			2,817	1,967,694			66,470	2,036,981
\$			2,763	1,605,065			66,470	1,674,298
Total..... tons	152,463	111,612	3,818,126	5,396,233	147,075	7,903	361,091	9,994,506
\$	320,316	284,869	5,752,786	4,850,528	1,085,479	21,736	718,495	13,034,209
Per cent of total..... Quantity	1.5	1.1	38.2	54.0	1.5	1.0	3.6	100.0
Value	2.5	2.2	44.1	37.2	8.3	0.2	5.5	100.0

Table 310.—Production of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1931

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	2,033	98	15,890	35,090	8,877		1,700	63,688
Dressed..... tons	22,770	1,083	90,770	159,950	70,540		10,540	355,653
Monumental and ornamental—								
Rough..... tons	40	2,844	40,462	4,999	7,603		9,709	65,657
Dressed..... tons	2,889	123,497	2,114,606	75,417	445,191		600,740	3,362,340
Flagstone..... tons	110	457	6,034	362			633	7,596
Curbstone..... tons	1,200	5,557	56,665	12,181			9,328	84,931
Paving blocks..... tons	465	836	1,874	46		67	500	3,788
Lining open-hearth furnaces..... tons	19,360	112,528	92,879	2,232		3,800	30,680	261,479
Chemical—								
Flux in iron and steel plants..... tons	6,665		1,346	93,294	1,645	702		103,652
Flux in smelters..... tons	7,364		1,674	62,571	2,770	1,264		75,643
Glass factories..... tons			2,230	36,367			31,950	70,547
Pulp and paper mills..... tons	4,559	19,865	45,089	34,528	8,478		17,928	130,447
Sugar refineries..... tons	10,263	26,784	34,983	36,780	9,326		38,527	156,663
Other chemical uses..... tons		15	16,799	6,566	244			23,624
Whiting..... tons		120	11,759	7,588	439			19,906
Asphalt filler..... tons	118		4,903					4,903
Dusting coal mines..... tons	2,185		3,645					3,645
Agricultural purposes..... tons	8,135		13,730	14,815				2,185
Poultry grit..... tons	40,675		41,885	33,308				28,545
Stucco dash..... tons	2,207	15,498	111,856	5,940	325		623	75,193
Terrazzo flooring..... tons	8,928	46,494	99,240	8,733	404		1,486	9,992
Rubble and riprap..... tons	22,694	22,657	313,275	43,558	5,110		233,743	44,024
Crushed stone..... tons	25,813	24,915	191,174	39,536	4,966		201,313	136,449
Concrete aggregate..... tons	11,875		2,423,172	839,179			1,050	165,285
Road metal..... tons	35,625		1,819,986	707,493			2,100	2,287
Railroad ballast..... tons	24,280		1,229,586	1,603,395	112,725		152,647	8,671
Total..... tons	83,181	62,325	4,263,528	3,359,364	153,248	2,496	471,717	6,334
Per cent of total..... Quantity	1.0	1.0	51.0	40.0	2.0		5.0	100.0
Value	2.0	3.0	53.0	26.0	6.0		10.0	100.0

Table 311.—*Production of Stone in Canada, by Kinds and by Provinces, 1930 and 1931

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1930								
Nova Scotia.....	7,856	38,107	79,941	88,545			64,666	193,664
New Brunswick.....	46,209	139,212	40,262	97,841			25,141	47,816
Quebec.....	711,943	2,042,783	2,811,300	2,774,539	11,619	717,362	283,264	218,102
Ontario.....	856,124	876,110	4,524,661	3,876,527	7,345	51,085	8,103	46,806
Manitoba.....			146,316	1,075,485	762	9,994		
Alberta.....			7,786	17,236			117	4,500
British Columbia.....	229,000	283,739	122,409	145,443	6,363	31,141	3,319	258,172
Canada.....	1,851,132	3,379,951	7,732,675	8,075,616	26,089	809,582	384,619	769,060
1931								
Nova Scotia.....	24,895	72,009	21,684	69,415			36,602	84,208
New Brunswick.....	2,583	148,881	35,378	73,398			24,364	119,712
Quebec.....	727,354	1,987,589	2,675,186	2,774,060	14,919	624,356	848,070	507,037
Ontario.....	133,905	232,557	3,215,697	2,594,328	4,323	29,173	5,439	25,386
Manitoba.....			152,858	636,226	390	6,423		
Alberta.....			2,429	5,842			67	3,800
British Columbia.....	302,150	322,014	159,198	152,269	810	8,761	9,559	592,740
Canada.....	1,199,887	2,763,050	6,262,430	6,305,538	20,442	668,713	921,101	1,332,883

*For production of slate see Table 302.

Table 312.—*Production of Stone in Canada, by Kinds, Showing Purposes for Which Used, 1930 and 1931

Kind	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building—								
Rough.....1930	13,402	149,535	63,625	329,013	308	8,740	13,950	118,006
1931	6,151	51,915	53,278	247,993	628	27,229	3,631	28,516
Dressed.....1930	24,909	1,189,120	49,688	1,416,277	3,386	687,115	3,936	286,972
1931	16,204	1,011,499	33,771	1,085,767	4,267	576,458	11,415	688,616
Monumental and ornamental—								
Rough.....1930	7,378	110,285	120	815	991	10,690		
1931	5,820	58,142	1,020	9,590	756	17,199		
Dressed.....1930	2,045	111,504	210	3,577				
1931	3,479	251,379	242	6,300				
Flagstone.....1930			172	502			67	3,800
1931	314	16,797	95	483			816	9,897
Curbstone.....1930	31,617	181,846	206	206			509	3,429
1931	40,613	187,431					316	5,845
Paving blocks.....1930	10,568	84,194						
1931	7,164	58,447						
Lining open-hearth furnaces.....1930			939	1,643				
1931			155	271				
Chemical—								
Flux in iron and steel plants.....1930			238,567	197,383				
1931			103,652	75,643				
Flux in smelters.....1930			144,472	110,724				
1931			70,547	57,441				
Glass factories.....1930			1,046	1,569				
1931			526	790				
Pulp and paper mills.....1930			157,253	181,908	8,192	12,785		
1931			124,347	151,600	6,100	5,063		
Sugar refineries.....1930			32,153	29,653				
1931			23,624	19,906				
Other chemical uses.....1930			4,773	6,512				
1931			4,903	3,645				
Whiting.....1930			72	1,338				
1931			118	2,185				
Asphalt filler.....1930			16,442	57,579	1,500	15,000	785	956
1931			28,545	75,193				
Dusting coal mines.....1930			1,289	5,800				
1931			9,092	44,024				
Agricultural purposes.....1930			61,884	181,754				
1931			136,426	165,147	23	138		
Poultry grit.....1930	2	65	530	5,339	1,938	11,264		
1931	3	72	1,154	3,055	1,130	5,544		
Stucco dash.....1930			400	600	9,182	62,298	62	250
1931			40	400	6,294	32,283		
Terrazzo flooring.....1930					229	1,145	4,472	4,918
1931					459	911		
Rubble and riprap.....1930	302,626	209,490	679,995	460,411	363	545	35,367	36,003
1931	262,525	226,066	324,793	190,503	185	288	53,534	70,860
Crushed stone—								
Concrete aggregate.....1930	512,688	307,338	1,368,503	1,152,166			233,913	164,400
1931	405,434	363,645	2,074,281	1,745,959			795,561	455,600
Road metal.....1930	271,393	352,570	3,547,859	2,940,552			90,993	141,813
1931	429,580	524,277	2,633,069	1,947,576	600	3,600	59,384	82,062
Railroad ballast.....1930	674,504	684,004	1,362,477	990,294				
1931	13,600	13,350	638,752	472,007				
Total.....1930	1,851,132	3,379,951	7,732,675	8,075,616	26,089	899,582	384,610	769,060
1931	1,190,887	2,763,050	6,262,430	6,305,538	20,442	668,713	924,101	1,332,883

*For production of slate see Table 302.

Table 313.—Production in Canada, by Kinds and by Provinces, Imports and Exports of Stone, 1929-1931

	1929		1930		1931	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION, BY KINDS—						
Granite.....	1,728,165	3,080,815	1,851,132	3,379,951	1,190,887	2,763,050
Limestone.....	7,720,840	8,172,681	7,732,675	8,075,616	6,262,430	6,305,538
Marble.....	14,012	414,062	26,089	809,582	20,442	668,713
Sandstone.....	159,407	398,974	384,610	769,060	924,101	1,332,883
Slate.....			150	3,000	250	5,000
Total.....	9,622,424	12,066,532	9,994,656	13,037,209	8,398,110	11,075,184
PRODUCTION, BY PROVINCES—						
Nova Scotia.....	264,706	376,222	152,463	320,316	83,181	225,632
New Brunswick.....	27,352	204,970	111,612	284,869	62,325	341,991
Quebec.....	3,484,471	5,317,859	3,818,126	5,752,786	4,265,529	5,893,042
Ontario.....	5,239,672	4,736,263	5,396,233	4,850,528	3,359,364	2,881,444
Manitoba.....	192,109	895,017	147,078	1,085,479	153,248	642,649
Alberta.....	5,183	24,546	7,903	21,736	2,496	9,642
British Columbia.....	408,931	511,655	361,241	721,495	471,967	1,080,784
Canada.....	9,622,424	12,066,532	9,994,656	13,037,209	8,398,110	11,075,184
IMPORTS—						
Building stone, other than marble or granite, sawn on more than two sides, but not sawn on more than four sides.....	471	6,285	139	2,029	837	7,824
Building stone other than marble or granite, planed, turned, cut or further manufactured than sawn on four sides.....	1,826	77,685	1,492	78,904	110	3,544
Flagstone, rough sandstone, and all building stone, not hammered, sawn or chiselled.....		307,013		309,930		150,593
Flagstone and building stone, other than marble or granite, sawn on not more than two sides.....		233,084		107,783		20,377
Granite, rough, not hammered or chiselled.....		65,036		78,233		50,599
Granite, sawn only.....		22,799		8,999		3,815
Granite, manufactures of, n.o.p.....		44,857		42,158		19,848
Granite monuments.....		137,359		132,622		94,806
Paving blocks.....				2,876		25
Marble, rough, not hammered or chiselled.....		237,680		243,621		90,526
Marble, sawn or sand rubbed, not polished.....		267,497		264,869		144,971
Marble, manufactures of, n.o.p.....		187,717		170,001		103,528
Refuse stone.....	645,768	405,077	303,462	233,182	237,373	197,810
Manufactures of stone, n.o.p.....		76,364		65,301		62,376
Total.....		2,668,453		1,740,508		950,642
EXPORTS—						
Crushed stone.....	116,950	200,000	136,837	235,406	74,244	135,140
Granite and marble, unwrought.....	2,467	23,189	1,768	21,913	2,938	52,058
Freestone, limestone, and other building stone, unwrought.....	661	8,867	2,149	15,829	305	2,087
Dressed stone.....		5,065		4,110		3,080
Total.....		237,121		277,258		192,365

(2) SECONDARY PRODUCTION—The Monumental and Ornamental Stone Industry

Production from stone dressing works operated separately from quarries amounted in value to \$5,989,372 in 1931. This output was 28 per cent under the record for the industry of \$8,355,605 in 1930 but was slightly above the 1927 total of \$5,606,984. During 1931 a total of 223 plants were engaged solely in the cutting or dressing of stone for building or ornamental purposes. Of this total 118 were located in the province of Ontario, 45 in Quebec, 14 in Manitoba, 12 in British Columbia, 11 in Nova Scotia, 8 in New Brunswick, 8 in Saskatchewan, 5 in Alberta, and 2 in Prince Edward Island. These concerns had an aggregate operating capital of \$6,880,835 and afforded work each month of the year to an average of 1,436 people who were paid \$2,145,023 in salaries and wages. Unfinished stone bought for cutting or dressing during the year cost \$1,697,909 at the works.

Table 314.—Number of Plants, Employees and Value of Products of the Monumental and Ornamental Stone Industry in Canada, by Provinces, 1930 and 1931

Province	1930			1931		
	Number of plants	Number of employees	Selling value of products	Number of plants	Number of employees	Selling value of products
			\$			\$
Prince Edward Island and Nova Scotia.....	13	51	200,387	13	97	356,821
New Brunswick.....	11	75	174,082	8	28	78,458
Quebec.....	44	438	1,618,065	45	274	958,042
Ontario.....	118	1,036	5,421,029	118	807	3,853,865
Manitoba.....	15	128	307,396	14	81	239,976
Saskatchewan.....	8	46	163,426	8	37	118,100
Alberta.....	5	74	217,822	5	45	106,761
British Columbia.....	12	71	253,398	12	67	277,349
Canada.....	226	1,919	8,355,605	223	1,436	5,989,372

Table 315.—Products of the Monumental and Ornamental Stone Industry in Canada, 1930 and 1931

Item	1930	1931
	Total selling value at works	Total selling value at works
	\$	\$
Granite, cut and polished—(a) Monuments.....	1,815,143	1,584,099
(b) For building purposes.....	902,519	1,032,202
Marble, cut and polished—(a) Monuments.....	350,323	257,668
(b) For building purposes.....	1,339,108	1,054,952
Marble chips and dust.....	29,625	5,513
Limestone—(a) Monuments and bases.....	319,472	43,584
(b) For building purposes.....	2,706,390	1,372,121
Finished monuments, lettered only.....	816,308	613,593
Other products.....	76,717	25,640
Total.....	8,355,605	5,989,372

APPENDIX ONE

EXPLANATORY NOTES

Method of Computing Quantities and Values of the Mineral Production of Canada in 1931.

Arsenic.—White arsenic (As_2O_3) shipped from Canadian smelters at its sales value.

Bismuth.—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining at an arbitrary price; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

Cadmium.—Smelter production valued at the average New York price for the year.

Cobalt.—Cobalt content of the various cobalt products sold by Ontario smelters added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Copper.—(a) Recoverable copper in ores and concentrates exported valued at the average New York price for the year, in Canadian funds; (b) Copper in blister copper made by British Columbia, Manitoba and Quebec smelters valued at the average New York price for the year in Canadian funds; (c) Copper in converter copper made at Port Colborne, Ont., and Copper Cliff, Ont., valued pro rata according to income from sales; (d) Copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary price agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

Gold.—Gold in bullion produced and the recoverable gold in all other Canadian mine products valued at the standard rate of \$20.671834 per fine ounce.

Lead.—(a) Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year in Canadian funds; (b) Sales from the smelter of the Kingdon Mining, Smelting and Manufacturing Co. Ltd., Galletta, Ont.

Nickel.—(a) Refined and electrolytic nickel produced at Canadian refineries valued at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte form).

Platinum Group Metals.—Recoverable metals in smelter products and placer platinum at the average New York price.

Silver.—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price for the refined metal in Canadian funds.

Zinc.—Refined zinc produced by the Consolidated Mining and Smelting Co. Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co. Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London in Canadian funds.

Coal.—Output tonnage evaluated pro rata according to income from sales.

Other Non-Metallic Minerals, Clay Products and Structural Materials.—Shipments during the year at their respective sales values.

Imports.—Statements of quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The price and value of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country the currency of which is not substantially depreciated.

Exports.—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

Weight.—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression ton means 2,000 pounds, and cwt. 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

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STATISTICS OF MANUFACTURES—based chiefly on minerals.

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Iron and Steel and Their Products: Pig Iron and Ferro-Alloys—Steel and Rolled Products—Castings and Forgings—Boilers, Tanks and Engines—Agricultural Implements—Machinery—Automobiles—Auto Accessories—Bicycles—Railway Rolling Stock—Wire and Wire Goods—Sheet Metal Products—Hardware and Tools—Bridge Building and Structural Steel—Miscellaneous Iron and Steel Products.

Manufactures of Non-Ferrous Metals: Aluminium Products—Brass and Copper Products—Lead, Tin and Zinc Products—Jewellery and Silverware—Electrical Apparatus and Supplies—Miscellaneous Non-Ferrous Metal Products—Non-Ferrous Smelting and Refining.

Manufactures of Non-Metallic Minerals: Aerated Waters—Asbestos Products—Cement—Cement Products—Coke and Gas—Glass (blown, cut, ornamental, etc.)—Lime—Petroleum Products—Products from Domestic Clays—Products from Imported Clays—Salt—Sand—Lime Brick—Dressed Stone—Artificial Abrasives and Abrasive Products—Miscellaneous Non-Metallic Mineral Products, including (a) Artificial Graphite and Electrodes, (b) Gypsum Products, (c) Mica Products, (d) Magnesite Products, (e) Non-Metallic Mineral Products, n.e.s.

Chemicals and Allied Products: Coal Tar Distillation—Acids, Alkalies and Salts—Compressed Gases—Explosives, Ammunition and Fireworks—Fertilizers—Medicinal and Pharmaceutical Preparations—Paints, Pigments and Varnishes—Soaps and Washing Compounds—Toilet Preparations—Inks—Adhesives—Polishes and Dressings—Flavouring Extracts—Wood Distillation—Miscellaneous Chemical Products, including (a) Baking Powder, (b) Boiler Compounds, (c) Celluloid Products, (d) Insecticides, (e) Sweeping Compounds, (f) Disinfectants, (g) Matches, (h) Dyes and Colours, (i) Miscellaneous Chemical Products, n.e.s.

Annual Bulletins.—In addition to the foregoing printed reports, a series of bulletins is issued annually, each of which presents the principal statistics relative to production: (a) in a particular industry, e.g. Automobiles—Petroleum Products, etc., (b) in each of the four main groups of industries. These are published in mimeograph form from time to time during the year as the necessary material becomes available and provide advance information on these industries.

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Production of Pig Iron and Steel in Canada.

Coal and Coke Statistics for Canada.

Automobile Statistics for Canada.

Quarterly—

Analysis of the Radio Industry in Canada.

SPECIAL REPORTS—

Report on the Consumption of Prepared Non-Metallic Minerals in Canada.

Report on the Consumption of Mine and Mill Materials in Canada.

Report on the Consumption of Coke in Canada.

The Fertilizer Trade in Canada.



-D-28

CANADA—DEPARTMENT OF TRADE AND COMMERCE
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT

ON THE

MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR

1932

Published by Authority of the Hon. H. H. Stevens, M.P.,
Minister of Trade and Commerce



OTTAWA
J. O. PATENAUDE
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1934

Price, 50 cents

LIST OF PUBLICATIONS

PREPARED IN THE

MINING, METALLURGICAL AND CHEMICAL BRANCH DOMINION BUREAU OF STATISTICS

MINERAL PRODUCTION (Mining and Metallurgy).

General Reports—

Preliminary Reports (semi-annual) on the Mineral Production of Canada.

Monthly Reports on Canada's Leading Mineral Products.

Annual Report on the Mineral Production of Canada. (In one volume).

A comprehensive record of the mining industry embodying historical and world data, detailed information on mineral production, imports and exports for Canada and general statistics relative to the mining industry on capital investment, employment, fuel consumption and power equipment, arranged in 9 chapters, each dealing with a particular branch of the industry. Statistics on production and trade in mineral products appear in detail in the appropriate chapters. Fully indexed. Chapter titles are: Canada—The Gold Mining Industry—The Silver Mining Industry—The Nickel-Copper Industry—Miscellaneous Metal Mining Industries—The Non-Ferrous Smelting and Refining Industry—The Coal Mining Coke, Natural Gas, Peat and Petroleum Industries—Non-Metal Mining Industries (Other than Fuels)—The Clay Products and Other Structural Materials Industries—Notes on the Methods of Computing Values—Index.

Coal—

Monthly and Quarterly Reports on Coal and Coke Statistics for Canada.

A condensed report on production, imports and exports of coal and coke is issued monthly, publication being made about the twentieth of the next following month.

A more general review is published quarterly, showing statistics for each month, for the quarter, and for the year to date on the output by coal-mining districts and by provinces, imports and exports by ports and by kinds of coal, employment in coal mining, and tonnage lost. There is also a section on coke showing production, imports, exports, distribution and consumption by months and by provincial groups.

Annual Report on Coal Statistics for Canada.

Text and tables showing for Canada, and for each of the coal-producing provinces, historical and current data on output, tonnage lost, disposition of coal from the mines, domestic and foreign shipments, exports and imports by ports, consumption of coal, prices, employment, salaries and wages paid, power equipment, capital investment, etc.

ANNUAL BULLETINS—

Metals—The Gold Mining Industry in Canada which includes Alluvial Gold Mining, Auriferous Quartz Mining, Copper-Gold-Silver Mining, and tables showing Canadian and world production of Gold.—The Silver Mining Industry in Canada, which includes Silver-Cobalt-Arsenic Mining, Silver-Lead-Zinc Mining, and tables showing Canadian and world production of Arsenic, Cobalt, Lead, Silver and Zinc.—The Nickel-Copper Mining, Smelting and Refining Industry, which includes Canadian and world production of Nickel.—The Canadian and World Production of Copper.—Metals of the Platinum Group.—The Production of Miscellaneous Metals including Antimony, Beryl, Bismuth, Cadmium, Chromite, Lithium, Manganese, Mercury, Molybdenite, Radium, Selenium, Tin, Titanium, Tungsten.—The Non-Ferrous Smelting and Refining Industry.

Non-Metals.—Abrasives—Asbestos—Coal—Feldspar—Gypsum—Iron Oxides—Mica—Natural Gas—Petroleum—Quartz—Salt—Talc and Soapstone—Miscellaneous Non-Metallic Minerals including Actinolite, Barytes, Bituminous Sands, Fluorspar, Graphite, Magnesite dolomite, Bog Manganese, Natural Mineral Waters, Phosphate, Silica Brick, Sodium Carbonate, Sodium Sulphate, Sulphur (Pyrites).

Structural Materials.—Cement—Clay and Clay Products—Lime—Sand and Gravel—Stone.

SEE INSIDE BACK COVER FOR PUBLICATIONS ON MANUFACTURES BASED CHIEFLY ON MINERALS

CANADA—DEPARTMENT OF TRADE AND COMMERCE
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT
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NOTE ON STATISTICS OF PRODUCTION

In the collection of production data, the Dominion Bureau of Statistics makes a division between primary and secondary production. In the first-named class, there are separate sections for the collection of statistics on (a) **Agricultural Products**, (b) **Furs**, (c) **Fish**, (d) **Forest Products**, (e) **Mineral Products**.

In the second are included (a) **Manufacturing** and (b) **Construction**.

Manufacturing is subdivided into nine groups of industries, producing concerns being classified according to the principal component material of their major products. For example, manufactures of leather goods are classified under "Animal Products"; the pulp and paper industry under "Wood and Paper", etc. An outline of the scheme of classification in use for manufacturing industries is given below:

Manufactures of—

- (1) **Vegetable Products**, including—Coffee and Spices; Cocoa and Chocolate; Preserved and Canned Products; Pickles, Vinegar and Cider; Flour and Cereals; Bread and other Bakery Products; Macaroni and Vermicelli; Distilled and Brewed Liquors and Wines; Rubber Products; Starch and Glucose; Sugar; Tobacco Products; Linseed Oil and Oil Cake.
- (2) **Animal Products**, including—Fish and Fish Products; Dairy Factory Products; Meat and Meat Products; Leather and Leather Products; Furs and Fur Products.
- (3) **Textiles and Textile Products**, including—Cotton Textiles (Cloth, Yarn, Thread and Waste); Woollen Textiles (Cloth, Yarn, Blankets, Felt and Waste); Silk Products; Factory-Made Clothing; Carpets, Rugs and Mats; Cordage, Rope and Twine.
- (4) **Wood and Paper**, including—Pulp and Paper Mill Products; Paper Goods; Printing, Publishing and Lithographing; Saw and Planing Mill Products; Furniture; Carriages; Wagons and Sleighs; Wooden Containers; Woodenware; Turned Wood Products; and the Output of Similar Wood-Using Industries.
- (5) **Iron and Steel and Their Products**, including—Pig Iron and Ferro-Alloys; Steel and Rolled Products; Castings and Forgings; Boilers, Tanks and Engines; Agricultural Implements; Machinery; Automobiles; Auto Parts and Accessories; Bicycles; Railway Rolling Stock; Wire and Wire Goods; Sheet Metal Products; Hardware and Tools; Bridge Building and Structural Steel Work; Miscellaneous Iron and Steel Products.
- (6) **Manufactures of Non-Ferrous Metal Products**, including—Aluminium Products; Brass and Copper Products; Lead, Tin and Zinc Products; Jewellery and Silverware; Electrical Apparatus and Supplies; Non-Ferrous Smelting and Refining; Miscellaneous Non-Ferrous Metal Products.
- (7) **Manufactures of the Non-Metallic Minerals**, including—Aerated Waters—Asbestos Products—Cement—Cement Products—Coke and Gas—Glass (blown, cut, ornamental, etc.)—Lime—Petroleum Products—Products from Domestic Clays—Products from Imported Clays—Salt—Sand—Lime Brick—Dressed Stone—Artificial Abrasives and Abrasive Products—Miscellaneous Non-Metallic Mineral Products including (a) Artificial Graphite and Electrodes, (b) Gypsum Products, (c) Mica Products, (d) Miscellaneous Non-Metallic Mineral Products, n.e.s.
- (8) **Chemicals and Allied Products**, including—Coal Tar Distillation; Acids, Alkalies, and Salts—Compressed Gases; Explosives, Ammunition and Fireworks; Fertilizers; Medicinal and Pharmaceutical Preparations; Paints, Pigments and Varnishes; Soaps and Washing Compounds—Toilet Preparations; Inks; Adhesives; Polishes and Dressings; Wood Distillation; Miscellaneous Chemical Products including (a) Baking Powder, (b) Boiler Compounds, (c) Cellulose Products, (d) Insecticides, (e) Sweeping Compounds, (f) Disinfectants, (g) Matches, (h) Dyes and Colours, (i) Chemical Products, n.e.s.
- (9) **Miscellaneous Products**, including—Brooms and Brushes; Electric Light and Power; Musical Instruments, etc.

The statistics of manufactures are also classified according to the **use or purpose** of the end product as follows:—

- (1) **Food**, including—Breadstuffs; Fish; Nuts; Fruits and Vegetables; Meats; Milk Products; Oils and Fats; Sugar; Infusions; Miscellaneous.
- (2) **Drink and Tobacco**, including—Beverages, alcoholic; Beverages, non-alcoholic; Tobacco.
- (3) **Clothing**, including—Boots and Shoes; Fur Goods; Garments and Personal Furnishings; Gloves and Mitts; Hats and Caps; Knitted Goods; Waterproofs; Miscellaneous.
- (4) **Personal Utilities**, including—Jewellery and Time-Pieces; Recreational Supplies; Personal Utilities, n.e.s.
- (5) **House Furnishings**.
- (6) **Books and Stationery**.
- (7) **Vehicles and Vessels**.
- (8) **Producers' Materials**, including—Farm Materials; Manufacturers' Materials; Building Materials; General Materials.
- (9) **Industrial Equipment**, including—Farming Equipment; Manufacturing Equipment; Trading Equipment; Service Equipment; Light, Heat and Power Equipment; General Equipment.
- (10) **Miscellaneous**.

PREFACE

This annual report is a statistical review of Canada's mining industry and is issued in continuance of the annual series first published by the Geological Survey of Canada in 1886, later by the Mines Branch of the Department of Mines, and since 1921 by the Dominion Bureau of Statistics. It contains final data on production, imports and exports of Canada's metals and minerals, figures on the capital invested in the mining industry, the number of employees, salaries and wages paid, the amount and kind of fuel used, and the power equipment installed. Tables of world production of the more important minerals and metals are included for the purpose of assisting those who may be making international studies and who may not have a reference library readily accessible.

The 1931 report contained a chronological record of the principal mining events which have occurred in Canadian history. As this was the first attempt to make such a compilation it was requested that the Bureau be notified of any inaccuracies or omissions. Several corrections were suggested and the changes have been made in the record.

In addition to this report the Bureau issues a preliminary report of mineral production about March 15th following the year to which it refers. Since the fuel problem is of major importance to Canada, a separate annual report and quarterly reports on coal statistics are published. Statistical bulletins on the production of Canada's principal minerals are issued monthly and bulletins on various branches of the mining industry are published as the information becomes available.

As in former years, the Bureau has continued to co-operate with the provinces of Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia in the collection of coal statistics.

By arrangement, the Bureau and the Mines Departments of the provinces of Quebec, Ontario, Manitoba and British Columbia use joint forms in the collection of mineral statistics. This system is of considerable advantage to the operator, as he now has to file only one form in duplicate, and it also tends to greater comparability in Dominion and Provincial figures.

The cordial thanks of the Bureau are tendered to mine and smelter operators, to the Department of the Interior, to the Federal Department of Mines, to the Royal Canadian Mint and to the Imperial Institute, London, for assistance given and information made available. The railway and other transportation companies, as well as smelter operators outside of Canada, have also furnished data, the receipt of which is gratefully acknowledged.

This report has been prepared under the direction of Mr. W. H. Losee, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch, by Mr. R. J. McDowall, B.Sc., and Mr. B. R. Hayden of the mineral division staff.

R. H. COATS,

Dominion Statistician.

DOMINION BUREAU OF STATISTICS,

OTTAWA, February 25, 1934.

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DOMINION BUREAU OF STATISTICS

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CHRONOLOGICAL RECORD OF CANADIAN MINING EVENTS, 1604-1934.

Year

- 1604—Discovery of iron and silver reported at St. Mary's Bay, Nova Scotia, by Master Simon, a mining engineer accompanying Champlain. Native copper was also reported to have been found at Cap d'Or.
- 1654—Louis XIV granted a concession to Nicholas Denys to mine gold, silver, copper and other minerals on Cape Breton Island.
- 1672—Nicholas Denys reports the discovery of coal on Cape Breton Island.
- 1677—Intendant of New France, M. Duchesneau, proclaimed the imposition of a royalty of 20 sous per ton on coal mined in Cape Breton.
- 1711—Admiral Walker obtains coal in Cape Breton.
- 1720—First coal produced in Canada by regular mining methods on north side of Cow Bay, Cape Breton, N.S.
- 1724—Coal was exported from Cape Breton to Boston.
- 1737—Iron ores smelted on St. Maurice river, Quebec, by Cugnet & Cie or "La Compagnie des Forges."
- 1744—Publication of Bellin's map showing existence of silver-lead ores on Lake Temiskaming, Quebec, now known as the Wright mine.
- 1770—Jesuit Fathers experimented with native copper found at Point Mamainse, north shore Lake Superior.
Alexander Henry, English trader, formed a mining company, in which the Duke of Gloucester and other prominent Englishmen were partners, to develop minerals near Sault Ste. Marie, Ontario.
- 1771—Samuel Hearne, Hudson's Bay clerk, prospects the Copper Mine River area, Northwest Territories, for copper.
- 1779—Earliest recorded gypsum mining operations by settlers, Nova Scotia.
- 1782—Coal mined in vicinity of Grand Lake, New Brunswick.
- 1784—Government commenced systematic coal mining on northwest shore of Sydney Harbour, N.S.
- 1789—Sir Alex. MacKenzie discovers coal on Great Bear River, Northwest Territories.
- 1800—First iron furnace in Ontario erected in Leeds county at Furnace Falls (Lyndhurst) by D. Sherwood, S. Barlow, W. Sutherland and E. Jones.
David Thompson discovers coal on Saskatchewan river.
- 1813—Blast furnace erected by John Mason at Normandale, Norfolk county, Ontario, used unsuccessfully in treating bog ores.
- 1820—Blast furnace erected in Marmora twp., Hastings county, Ontario, by Mr. Hayes.
- 1822—First record of gypsum mining in Ontario, near Paris.
Normandale iron furnace commenced successful iron smelting operations in Ontario under Mr. Van Norman.
- 1823—Placer gold discovered on Chaudière River, Quebec, by a woman.
First gypsum mill operated in Ontario.
- 1826—General mining association formed in Nova Scotia.
- 1829—Lièvre river apatite deposits in Quebec discovered.
- 1830—First mining shaft in Nova Scotia sunk on Sydney main coal seam.
- 1835—Coal discovered at Suquash, Vancouver Island, through information supplied by Indians.
- 1840—First hydraulic cement made in Canada at Hull, Quebec.
- 1843—Geological Survey of Canada instituted under Sir Wm. Edmund Logan.
- 1846—Silver veins reported in vicinity of Thunder Bay, Lake Superior.
Ascanio Sobrero, Italian, first makes nitroglycerine.
- 1847—Normandale iron furnace in Ontario shut down owing to lack of ore and fuel.
First mention of copper ores in Eastern Townships, Quebec, in Geological report, 1847-48.
Gypsum mining operations commenced near Hillsborough, New Brunswick.
- 1848—Montreal Mining Company commenced mining at Bruce Mines, Ontario.
- 1850—Indians located Douglas coal seam at Nanaimo, B.C.

- 1852—August 24, J. W. McKay, Hudson's Bay Co. factor sent by James Douglas from Victoria to take possession of Nanaimo coal field and collect royalty from users of coal.
Free gold discovered in quartz at Mitchell harbour, Queen Charlotte Islands, causing the first auriferous quartz rush in British Columbia.
- 1853—March 26. Governor Douglas, Victoria, issued, as Lieutenant Governor of Queen Charlotte Islands, Crown Colony, the first proclamation relating to mining in British Columbia.
- 1855—Placer gold found at the mouth of Pend d'Oreille River, B.C., by ex-servants of the Hudson's Bay Company at Fort Colville.
- 1857—Sir James Hunter located coal on Souris river, Manitoba.
Placer gold reported at the junction of the Fraser and Thompson rivers, B.C.
December 28. James Douglas issued proclamation regarding working of gold mines located chiefly in the Kamloops, Ashcroft, and Vernon areas of British Columbia.
- 1858—Introduction of Canadian decimal currency.
Legislature of Nova Scotia obtained possession and control of mines and minerals of province.
First producing oil well on American continent opened in Lambton county, Ontario.
Discovery of placer gold in the lower reaches of the Fraser river, B.C., caused rush to Yale, Hope and Canyon by miners from California and other foreign parts.
- 1859—Passage of the Goldfields Act, British Columbia, Sept. 7.
Placer miners penetrate to Cariboo and Quesnel, B.C.
Canadian silver coinage issued.
- 1860—John Pulsiver discovered gold in Tangier district, Halifax county, N.S.
Pete Toy bar discovered at the Parsnip and Findlay rivers, B.C.
Crushing plant erected at Wellington Copper Mine, Ontario.
- 1861—Gold discovered in Oldham district, Halifax county, N.S.
- 1862—Gold discovered in Lawrencetown, Isaacs Harbour and Renfrew districts, N.S.
- 1863—Miners from State of Washington ascending the Kootenay, established Wildhorse Creek diggings, B.C.
Issue of a comprehensive Geology of Canada under Sir William Logan.
- 1864—Placer gold located on Leech Creek, B.C.
Copper claims staked on Howe Sound and Knight Inlet.
- 1865—Dewdney trail completed to Wildhorse from Hope, B.C., to enable gold escorts to reach Victoria on British territory.
Placer claims staked on Big Bend area of Columbia river, B.C., by former Cariboo miners.
Gold discovered in Mount Uniacke district, Nova Scotia.
Eustis mine opened in Eastern Townships, Quebec.
- 1866—First discovery of gold in Canadian Pre-Cambrian shield near Madoc, Hastings county, Ontario, known as Richardson mine, made by a Dutch prospector named Powell and associates. Thos. McFarlane discovered high grade silver ores in Ontario on an island in Lake Superior. (Silver Islet mine).
First recorded production of salt in Ontario, near Maitland river.
- 1866—Alfred Bernard Nobel discovered the method of making dynamite.
- 1869—Gold discovered in Fifteen Mile Stream district, Nova Scotia.
Gold discovered in Yukon river.
Salt produced at Seaforth, Ontario.
- 1870—First commercial shipments of apatite in Canada made from North Burgess twp., Ontario. Montreal Mining Company sold Lake Superior mining lands, including Silver Islet.
- 1871—First recorded production of soapstone in Quebec from Bolton twp., Brome county.
Dominion Lands Survey Branch created.
Huronian mine (Moss) N.W. Ontario, located by Peter McKellar on advice of an Indian.
First staking of silver ores on Eureka Mt., near Hope, B.C.
- 1873—Dease Lake areas, B.C., staked for placer gold, first staker W. H. Smith.
Omineca placer mining area began to open up and Manson creek settlement established.
- 1877—Geological Survey of Canada recognized by Act of Parliament.
- 1878—Asbestos first mined in Quebec by Andrew Johnston (Johnston Asbestos Co.)
Gold discovered at Lake of the Woods, Ontario.
- 1879—Coal fields of the Crows Nest Pass, B.C., opened.
- 1880—Geological Survey offices and museum moved from Montreal to Ottawa.
- 1881—Quebec Technical Mines Branch formed as division of Crown Lands Department.
Zenith zinc mine discovered, Nipigon district, Ontario.
- 1883—Copper-nickel ores discovered near Sudbury (Murray mine) by Thos. Flanagan.
Miners penetrated into the West Kootenay district, British Columbia, locating mines on Kootenay river and Kootenay lake.
- 1884—Worthington mine, Sudbury area, Ontario, discovered by F. C. Crean.
Silver Islet mine, Lake Superior, abandoned.
Kingdon lead mine deposits, Carleton county, Ontario, worked.
Thos. Frood and A. J. Cockburn discovered Frood mine, Sudbury area, Ontario.
Renaldo McConnell discovered copper-nickel ore in Snyder twp., Ontario.
- 1885—Samuel J. Ritchie organized Canadian Copper Company.
Copper Cliff mine, Ontario, discovered.
Henry Ranger located Creighton mine, Sudbury area, ore deposit first noted by Surveyor Salter and Geologist Murray.

- 1885—Canadian Pacific Railway completed.
John Chance staked Granite Creek placer deposits in British Columbia.
Cayoosh Creek placers staked in British Columbia.
James Stobie discovers Stobie mine, Sudbury area, Ontario.
- 1886—First shipments of coal from Lethbridge area, Alberta.
First complete statistical returns issued by Geological Survey of Canada.
Incorporation of Canadian Copper Company.
First stakings in Boundary Creek area, British Columbia, by W. T. Smith.
First officially recorded Canadian mica production in Ontario and Quebec.
Stobie and Evans mines, Sudbury district, opened.
- 1887—R. W. MacArthur and Wm. Forest discovered cyanide process for gold extraction, at Glasgow, Scotland.
- 1888—Asbestos first milled in Quebec by Scottish Canadian Asbestos Co.
Coal discovered near Banff, Alberta.
Coal mining commenced at Canmore, Alberta.
First smelter blown in at Copper Cliff, Ont., December 24th.
Monarch mine on Canadian Pacific Railway at Field, B.C., opened.
Discovery of natural gas in Essex county, Ontario.
- 1889—Levack mine, Sudbury area, Ontario, discovered by James Stobie.
H. H. Vivian and Company of Swansea, Wales, started organized mining operations in Sudbury area.
Discovery of Leamington gas field in Ontario.
James Riley, Glasgow engineer, discovered the hardening and toughening effect of nickel in steel making.
Rossland Camp at head of Trail Creek, B.C., opened by staking of Lily May by Joe Bourjouis.
- 1890—Coal first mined in Turtle Mountain field, Manitoba. Vaden mine.
First smelter blown in at Murray mine, Sudbury. Matte shipped to Wales.
- 1891—First shipments from Rossland, B.C., to Colorado Smelting Works, Butte, Montana.
Sultana mine, Lake of Wood district, Ontario, opened, closed 1906.
The United States navy concluded successful experiments using nickel-steel for the first time as armour plate.
Bureau of Mines, Ontario, organized.
Garson Mine, Sudbury, discovered by John T. Cryderman.
- 1892—Col. R. M. Thompson developed the Orford nickel-copper separation process.
Dr. Ludwig Mond developed the Mond copper-nickel separation process.
Sullivan camp, B.C., commenced by staking of the Hamlet, etc., claims by Pat Sullivan, John Cleaver, E. C. Smith and W. C. Burchett.
- 1893—Kneehills coal mines, Alberta, opened.
Mikado mine, Lake of Wood district, Ontario, discovered.
- 1894—Pilot Bay smelter constructed and silver-lead-zinc mines of Ainsworth and Slocan, B.C., became active.
- 1895—Sullivan mine, B.C., commenced shipping.
- 1896—Salt produced in Dauphin Lake district, Manitoba; sold to settlers.
Iron ore bounties inaugurated.
Black Donald graphite mine, Renfrew county, Ontario, discovered and operated in 1897.
Discovery of placer gold in Klondike, Yukon Territory.
Hall mines smelter at Nelson, B.C., opened.
Iron Mask staked August 13 at Kamloops, B.C., by Geo. Breedson.
B.C. Smelting and Refining Company started smelting Rossland ores at Trail in February—Promoters: D. C. Corbin and August Heinze.
- 1897—Pioneer mine, B.C., located September 6, by Wm. Allen.
- 1898—Atlin goldfields, B.C., discovered by prospectors turning aside from the Klondike gold rush; Rainy Hollow copper deposits discovered in same manner.
- 1898—Pioneer and other claims staked on Cadwallader Creek, B.C.
Britannia mine deposits, B.C., discovered by Oliver Furry.
- 1899—Helen iron mine, Ontario, opened by Algoma Steel Corporation.
Frood mine, Sudbury, opened.
Sunset claim, Copper Mountain, B.C., staked.
Granby Consolidated Mining, Smelting and Power Co., B.C., incorporated.
- 1900—Mond Nickel Company incorporated.
Corundum mining commenced in Renfrew county, Ontario.
Klondike gold production reaches maximum.
Nova Scotia Steel and Coal Co. acquire Sydney coal mines of General Mining Association.
April 1st, Grand Forks smelter started in B.C.
Bonanza mine, Observatory Inlet, B.C., discovered by Donahue and H. C. Flewin.
Granby smelter, at Greenwood Camp, B.C., blown in on August 21.
Talc mining started in Hastings county, Ontario.
- 1901—First wells drilled for natural gas in Medicine Hat field, Alberta.
Creighton mine, Sudbury area, commenced production.
Crofton smelter, B.C., started.
Britannia mine, B.C., started shipping concentrates to Tacoma.

- 1901—Hidden Creek mine, Observatory Inlet, B.C., discovered by McMillan, Rudge and H. C. Flewin.
Boundary Falls smelter, B.C., started.
Tyee smelter, B.C., started.
First active development of gypsum deposits in Manitoba, the Manitoba Union Mining Company erecting a crushing and calcining mill on Portage Bay.
- 1902—Incorporation of International Nickel Company of New Jersey.
Marysville smelter, B.C., constructed.
Electrolytic lead (Betts process) made at Trail, B.C.
- 1903—High grade silver-cobalt minerals discovered at Long Lake, later known as the Cobalt Camp, Temiskaming district, Ontario.
St. Anthony mine, Sturgeon Lake, commenced producing.
Settlement of Alaska Boundary dispute.
Production of aluminium at Shawinigan Falls, P.Q.
Mining commenced at Hedley, B.C.
First recorded natural gas production in Alberta.
- 1904—Nipissing Mines incorporated.
La Rose Mine, Cobalt, started producing.
W. G. Trethewey located Trethewey mine, Cobalt, Ont.
Coniagas mine located, Cobalt, Ont.
Copper-gold ores discovered in Chibougamou district, Quebec.
- 1905—Atikokan iron mine, Ontario, equipped for production.
Buffalo mine, Cobalt, Ont., started operating.
First recorded shipment of Canadian fluorspar, Madoc, Ont.
Original test work on cyaniding cobalt ores in Canada carried out at School of Mining, Kingston, Ont. Mining commenced at O'Brien mine, Cobalt, Ont.
- 1906—January 18th. Consolidated Mining and Smelting Co. of Canada, incorporated.
Ontario Mining Act passed.
Discovery of gold by Ollier and Renault on Lake Fortune (Lake Fortune Mine), P.Q.
Silver discovered at Elk Lake, Ontario.
Gold discovered at Larder Lake, Ontario.
First electrical mining equipment used in Canada installed at Creighton mine, Sudbury district, Ontario.
- 1907—Silver discoveries at Gowganda, Ont.
Silver discovered in South Lorraine, Ont.
Supplementary Revenue Act imposes tax on mining profits in Ontario.
Federal Department of Mines created under a Minister of Mines.
Silver and arsenic produced at Deloro, Ont., from silver-cobalt-nickel-arsenic ores of the Cobalt District of Ontario:
- 1908—First gold discovery in Porcupine area, Ontario, by H. F. Hunter.
First silver production from South Lorraine, Ont.
Branch of Royal Mint established at Ottawa, Ont.
First shipments of magnesite from deposits in Grenville twp., P.Q.
- 1909—Hollinger mine gold veins discovered by Benjamin Hollinger, John Miller and Alex. Gillies.
McIntyre mine veins, Porcupine, Ont., discovered by Alex. McIntyre.
Dome mine deposits, Porcupine, Ont., discovered by John Wilson and associates.
Cyaniding of low grade ores commenced at O'Brien mine, Cobalt, Ont.
- 1910—Premier mine, B.C., discovered by Bunting Bros. and Wm. Dilsworth.
Mixed nickel and cobalt oxides produced at Deloro, Ont.
- 1911—First gold discovery in vicinity of Kirkland Lake, Ont., made by W. H. Wright on what is now known as the Wright-Hargreaves mine.
Porcupine camp destroyed by fire with heavy loss of life.
Discovery of gold by J. J. Sullivan and H. Authier in Dubuisson twp., P.Q.
First recorded discovery of gold in Manitoba by Major E. A. Pelletier at Rice Lake.
First shipment of British Columbia gypsum used in cement manufacture.
Victoria Memorial Museum, Ottawa, completed.
Black Cobalt Oxide and Grey Cobalt Oxide first marketed from Deloro, Ont.
- 1912—Hollinger mine, Porcupine, commenced first milling operations.
Low grade cyanide process installed at Nipissing mine, Cobalt.
Copper Mountain claims, B.C., taken over by British Columbia Copper Co.
Natural gas production commenced in Stony Creek field, New Brunswick.
Harry Oakes staked ground later known as Lake Shore Mine at Kirkland Lake, Ont.
- 1913—Tough-Oakes mine, Kirkland Lake camp, Ontario, shipped high grade cobbled ore.
Gold discovered on Kirkland Lake properties known later as Lake Shore, Teck-Hughes, Kirkland Lake and Sylvanite mines.
Smelting of nickel ores commenced by Mond Nickel Co. at Garson, Ont., May 15.
Incorporation of British American Nickel Co., Ltd.
- 1914—Supplementary Revenue Act in Ontario changed to The Mining Tax Act.
Granby copper smelter, at Anyox, B.C., blown in.
Cyanidation first used in Kirkland Lake camp, at Tough-Oakes mine.
- 1915—Siscoe mine claims staked in Quebec by S. E. Siscoe.
Flin Flon ore deposits discovered by Thos. Creighton representing the Hammell-Currie-Fasken syndicate.

- 1916—Construction commenced on nickel refinery at Port Colborne, Ont.
Incorporation of International Nickel Co. of Canada.
Falconbridge Nickel deposits, Sudbury district, Ontario, later known as Falconbridge Nickel Mines discovered by drilling.
Pioneer mine, B.C., commenced drilling operations.
Electrolytic refined copper and zinc first produced at Trail, B.C.
- 1917—Teck Hughes mine, Kirkland Lake, started milling.
- 1918—Tough-Oakes mine temporarily closed.
Refined nickel produced in Canada at Port Colborne plant of International Nickel Co.
Premier mine, B.C., came into production.
- 1919—Lake Shore, Wright-Hargreaves, and Kirkland Lake mills commenced operations.
Ontario Department of Mines formed.
Smelter of British American Nickel Co. at Nickelton, Ont., and refinery at Deschenes, Que., commenced operations.
L. Beauvet discovered silver-lead ores at Keno Hill, Mayo district, Yukon.
First salt shipments from Malagash deposits in Nova Scotia.
- 1920—Rock salt discovered at Fort McMurray, Alberta.
- 1921—Noranda ore deposits, Quebec, staked by Ed. Horne.
First shipment of silver-lead ores from Mayo, Yukon.
Rubber mill liners used at Nipissing mill, Cobalt, Ont.
- 1922—Amulet mine claims, Quebec, staked by McDonough Bros.
Rod mills appeared as milling equipment in Canadian mining plants.
- 1923—Granada mine claims, Rouyn, Quebec, staked by R. C. Gamble et al.
Sherritt-Gordon ore deposit staked by Carl Sherritt and Phillip Sherlett in January.
Red Coulee well first to reach oil in Sunburst formation, southern Alberta.
- 1924—British American Nickel Co. went into liquidation.
Royalite No. 4 well, Turner Valley, Alberta, brought into production.
- 1925—Discovery of gold in Red Lake district by Lorne Howey on what was later known as the Howey mine.
Silver-lead ores milled at Wernecke, Yukon.
Waite-Ackerman-Montgomery mine claims staked by H. Montgomery.
Allenby Copper Company took over Copper Mountain claims in August and shipped concentrates to Trail, B.C.
- 1926—Aluminium first produced at Arvida, P.Q., by Aluminum Company of Canada.
Falconbridge Nickel Mines incorporated.
- 1927—Noranda mine commenced shipping; smelter operated for first time.
Central Manitoba mine operated mill for first time.
Sherritt-Gordon mines incorporated in Ontario, July 5.
- 1928—Collapse of Worthington mine.
Waite-Ackerman-Montgomery mine started shipping.
Merger of Mond and International Nickel Companies.
Coniaurum mill, Porcupine camp, Ontario, commenced production in July.
March mine, Porcupine camp, Ontario, came into production.
Disastrous underground fire, in February, at Hollinger mine, Porcupine camp, Ontario, 39 lives lost.
Argonaut and Associated Goldfields suspended gold mining operations in Ontario.
Tough-Oakes-Burnside mine closed November 28.
- 1929—Canada's mineral production reached a record value of \$310,850,246.
Red Coulee field, Alberta, began petroleum production.
Siscoe gold mine, Quebec, started production.
New 300 ton mill of Monarch mine, B.C., started producing.
Dome mine mill, Porcupine camp, Ontario, destroyed in October by fire.
New surface plant at Frood mine, Sudbury, Ont., placed in operation.
McIntyre mine, Porcupine, Ontario, erected small flotation plant.
- 1930—Gold discovered in Bannockburn township, Ontario, on what was later known as the Ashley mine.
Mill installed on Minto mine, Michipicoten, Ont.
New mill at Howey mine, Red Lake, Ont., commenced operations April 2.
Silver-radium ores discovered by G. Labine at Great Bear Lake, N.W.T.
Granada mine, Quebec, commenced production.
Manitoba, Saskatchewan and Alberta took over natural resources from federal government.
Island Falls power plant, Manitoba, operated for first time, June 1.
First refined zinc produced in November at Flin Flon, Manitoba, by Hudson Bay Mining and Smelting Co.
First blister copper produced at Flin Flon, Manitoba, in December.
New smelter of International Nickel Co. blown in at Copper Cliff, July 1.
New electrolytic copper refinery of Ontario Refining Co. placed in operation at Copper Cliff, Ont.
New Falconbridge Nickel Mines smelter blown in February 4, Sudbury, Ont.
Bismuth first produced at Trail, B.C.
Fuming plant constructed at Trail, B.C., for recovery of lead and zinc.

- 1930—Copper Mountain mine, B.C., closed down November 15.
Canada attained position of the world's second greatest gold producer.
Nitric cake and sulphuric acid produced regularly in new plant of Canadian Industries Limited at Copper Cliff, Ont.
- 1931—Toburn (Tough-Oakes) mine, Kirkland Lake, re-opened.
Lake Shore mine, Kirkland Lake, Ont., installs 200 ton flotation unit in mill.
Gold discoveries made in Swayze and Three Duck Lake areas, Ontario.
Parkhill and Minto mines in Michipicoten district, Ontario, came into production.
Gold discovered at Island Lake, Manitoba.
Commercial production of fertilizer commenced at Trail, and smoke claims against Consolidated Mining and Smelting Company settled.
Nipissing Mining Company, Cobalt, Ont., ceased mining silver-cobalt ores.
Selenium produced for the first time in Canada by Ontario Refining Co. Ltd.
Mining Corporation discontinued mining in South Lorraine, Ont.
Keeley Silver mine, South Lorraine, Ont., closed.
Canadian Copper Refiners Ltd., operated new copper refinery at Montreal East, P.Q.
Regular production commenced by Sherritt-Gordon mill, Manitoba, April 1st.
Equalization exchange premiums paid by Dominion Government to gold miners.
Exports of gold bullion without licence prohibited by Dominion government.
Great Britain went off the gold standard on September 21, and was followed by many other countries.
Big Missouri Mine, B.C., operated pilot mill.
Nickel Plate mine, Hedley, B.C., closed down.
Orford process plant completed at Copper Cliff, Ont.
Copper converters at Port Colborne, Ont., closed down in August, preparatory to transferring Orford process to Copper Cliff.
New Brunswick Power Commission plant came into operation in September, using Minto coal.
Test shipments of Ontario lignite, from Onakawana deposits, made to Germany.
- 1932—Ashley mine, Ontario, commenced gold production in October.
Nickel output in Ontario greatly reduced.
Kenty mine in Swayze area, Ontario, sank two shafts.
O'Brien Cadillac mine, Quebec, commenced gold milling.
Sherritt-Gordon, Manitoba, suspended mining operations in June.
San Antonio gold mine, Manitoba, commenced production in May.
Beattie gold mines, Quebec, commenced construction of mill.
Treadwell Yukon Mining Co. commenced production of gold in new mill on Bussière claims in Quebec.
The United States imposed duty of 4 cents per pound, in June, on foreign copper.
McLeod River Mining Corporation operated gold dredge near Peers, Alberta.
Salt produced commercially for first time at Neepawa, Manitoba.
First commercial shipment of silver-radium ores from Great Bear Lake, N.W.T., silver ores being smelted at Trail, B.C.
Silver reached a record low of 24.5 cents in New York, December 29.
Eldorado Gold Mines commenced treatment of radium-bearing ores in new plant at Port Hope, Ont.
Domestic Fuel Act expired June 20.
Moss mine, Thunder Bay district, Ontario, commenced gold production.
Mill at Braylorne mine, British Columbia, placed in operation.
Gold discovered at God's Lake, Manitoba.
Domestic copper sold in the United States, December 6, at 5 cents per pound, Connecticut an all time low for the metal.
First officially recorded statistics of metal production for Saskatchewan.
Treadwell Yukon mill at Wernecke, Yukon, permanently shut down and camp abandoned.
Union of South Africa abandoned gold standard, December 28, 1932.
- 1933—Monarch mine, Field, B.C., resumed production.
Beattie Gold mines, Quebec, commenced production of concentrates.
Port Hope radium refinery in Ontario came into production, radium and uranium compounds commercially produced for the first time in Canada.
Green-Stabell gold mine, Quebec, commenced milling of gold ores.
Oro Grande mine, Manitoba, commenced milling.
Macassa mine, Kirkland Lake, Ont., commenced milling.
The United States went off gold standard, April 19.
Cariboo Gold Quartz Mining Co. commenced gold production near Barkerville, B.C.
Amalgamation of Toronto and Standard Mining Stock Exchanges agreed upon.
The United States ratified, on December 22, the silver agreement of the London Economic Conference.
Salt produced at Simpson, Sask.
- 1934—January 31, the President of the United States issued proclamation reducing the gold weight of the United States dollar from 25.8 to 15 5/21 grains, 0.9 fine.
Dominion tax on gold came into effect April 19.

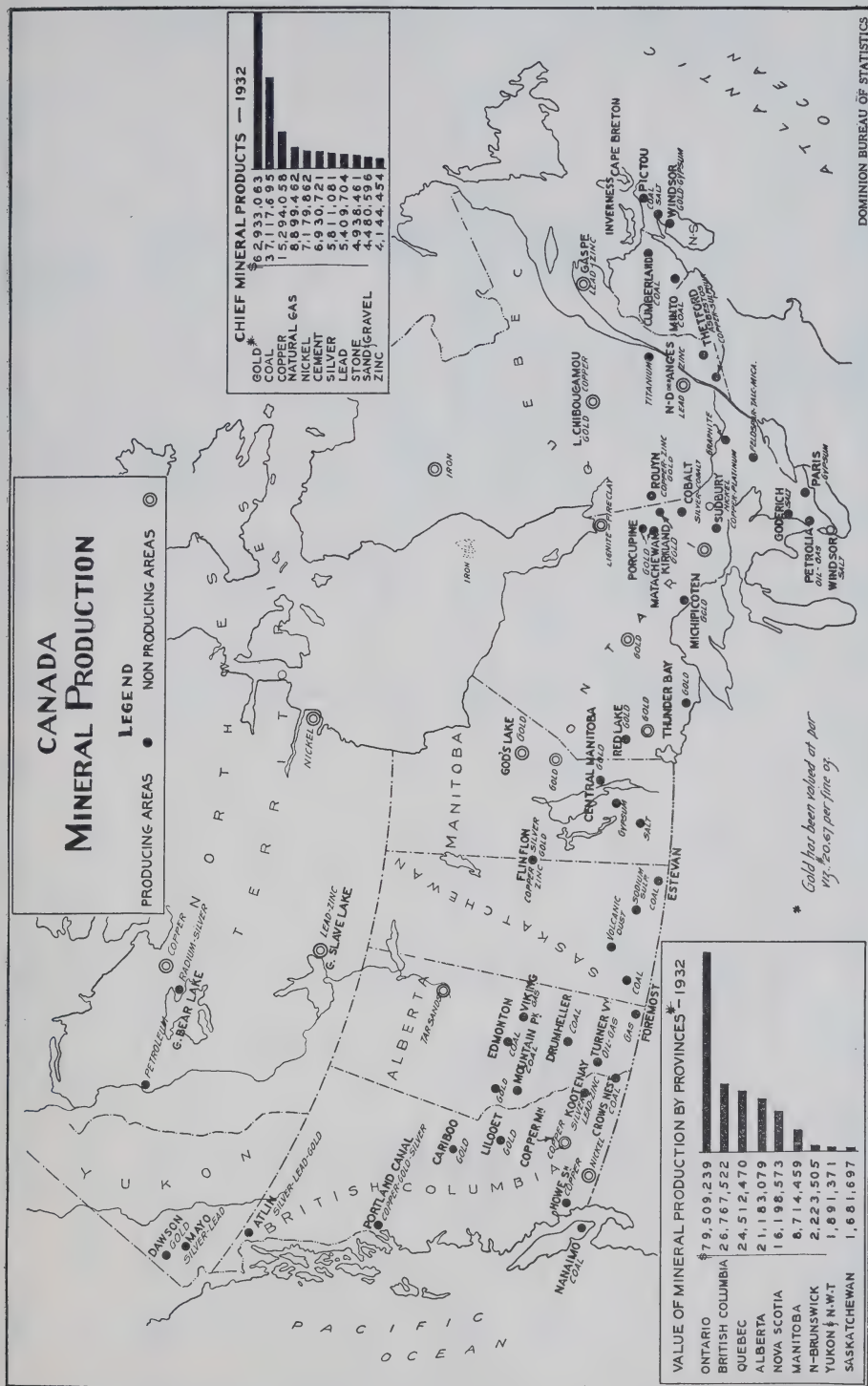


Table 1.—Mineral Production of Canada, by Provinces, 1932

—	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	*Yukon	Canada
METALLICS										
Arsenic lb.				2,424,342						2,424,342
(As ₂ O ₃)				98,714						98,714
Bismuth lb.				16,798				57		16,855
				7,289				51		7,340
Cadmium lb.								26,824		26,824
Chromite tons			78							78
			1,113							1,113
Cobalt lb.				490,631						490,631
				587,957						587,957
Copper lb.			67,336,692	77,055,413	52,706,861			50,580,104		247,679,070
			4,296,216	4,407,928	3,362,803			3,227,111		15,294,953
Gold fine oz.	964		401,105	2,280,105	122,507		83	199,004	40,608	3,044,387
	19,928		8,291,576	47,133,952	2,532,444	227	1,716	4,113,778	839,442	62,933,063
Lead lb.				86,477				252,007,574	3,853,327	255,947,378
				1,828				5,326,432	81,444	5,409,704
Nickel lb.				30,327,968						30,327,968
				7,179,862						7,179,862
Palladium, Rhodium, fine oz.				37,613						37,613
Iridium, etc.				901,890						901,890
Platinum fine oz.				27,284					59	27,343
				1,097,021				2,372		1,099,393
Silver fine oz.	47		628,902	6,335,788	1,036,497	14	9	7,293,462	3,053,188	18,347,997
	15		199,184	2,006,648	328,275	4	3	2,309,958	966,994	5,511,081
Zinc lb.					41,736,606			130,546,958		172,283,568
					1,004,016			3,140,438		4,144,454
Total	19,943		12,788,089	63,423,089	7,227,538	231	1,719	18,146,964	1,887,880	103,495,453
NON-METALLICS										
FUELS										
Coal tons	4,084,581	212,695			1,552	887,139	4,870,648	1,681,490		11,733,913
	15,167,793	794,168			3,684	1,229,449	13,526,309	6,392,801	808	37,117,695
Natural M.cuft. gas.		662,452		7,386,154	600		15,370,968		3,491	23,420,174
Peat tons		326,191		4,719,297	180		3,853,794			8,899,462
			762	2,486						3,248
			2,286	5,307						7,593
Petroleum, crude, brls.		6,408		130,343			*907,661			1,044,412
		14,332		247,468			*2,760,792			3,022,592
Total	15,167,793	1,134,691	2,286	4,972,072	3,864	1,229,449	29,140,895	6,392,801	3,491	49,047,342
OTHER										
NON-METALLICS										
Asbestos tons			122,977							122,977
			3,039,721							3,039,721
Bituminous sands							343			343
							1,372			1,372
Diatomite tons	1,438			11				47		1,496
	28,760			309				440		29,509
Feldspar tons			3,390	3,657						7,047
			39,062	42,920						81,982
Fluorspar tons				32						32
				464						464
Graphite tons				346						346
				18,483						18,483
Grindstones tons	12	256						60		328
	433	11,802						3,500		15,735
Gypsum tons	341,508	38,019		35,655	12,719			10,728		438,629
	398,861	297,520		186,175	113,739			84,084		1,080,379
Iron oxides (ochre) tons			5,017					223		5,240
			44,161					2,000		46,161
Magnesite dolomite			262,860							262,860
Mica lb.			81,137	537,212						618,349
			4,076	2,752						6,828
Mineral imp. gal. waters.			15,506	61,208						76,714
			4,697	2,473						7,170
Phosphate tons			1,316							1,316
			12,333							12,333
Quartz tons			20,123	66,135	87,253			15,621		189,132
			71,645	93,574	102,493			8,435		276,147
Salt tons	31,897			231,138	608					263,543
	150,708			1,789,751	7,092					1,947,551
Silica brick				93						93
				4,304						4,304
Soapstone tons			46,751				271,736			46,751
Sodium carbonate								495		495
								5,450		5,450
Sodium sulphate										
Sulphur tons			17,954	3,332				31,886		271,736
			133,838	33,320				302,856		53,172
Talc tons				12,064				39		470,014
				111,585				702		112,287
Volcanic dust						180				180
						3,600				3,600
Total	578,762	309,322	3,659,144	2,286,110	223,324	275,336	1,372	407,467		7,740,837

Note:—Gold valued at \$20.671834 per fine ounce.

Table 1.—Mineral Production of Canada, by Provinces, 1932—Concluded

—	Nova Scotia	New Brun- swick	Quebec	Ontario	Mani- toba	Saskat- chewan	Alberta	British Columbia	*Yukon	Canada
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS										
Clay Products										
Brick—										
Soft mud pro- cess—										
Face.... M	160		300	5,716				12		6,188
\$	2,008		3,000	103,390				184		108,582
Common. M	540	1,269	18	6,525	1,387	660	697	1,755		12,801
\$	6,780	18,180	912	98,828	18,166	6,929	8,345	24,232		182,372
Stiff mud pro- cess (wire cut)—										
Face.... M	347	487	13,180	15,315	320	115	277	156		30,197
\$	6,754	13,628	300,649	323,077	7,472	3,127	6,386	3,663		664,756
Common. M	2,229	520	28,063	7,816	416	220	989	500		40,753
\$	31,206	7,949	448,470	122,905	6,861	2,256	11,648	7,627		638,922
Dry press—										
Face.... M			319	4,667		6	310	220		5,522
\$			9,563	97,897		138	3,876	8,073		119,547
Common. M				1,522			2,726			4,248
\$				24,070			22,692			46,762
Fancy or orna- mental brick... M			89	36						125
\$			4,447	1,790						6,237
Sewerbrick M				638					5	643
\$				12,071					85	12,156
Paving brick... M								6		6
\$								155		155
Firebrick. M						309	11	1,260		1,580
\$						15,200	547	56,010		71,757
Fireclay.... tons	45	50				415		480		990
\$	280	1,956				3,111		6,479		11,826
Fireclay blocks and shapes \$	277	836				66,688		7,408		75,209
Structural tile—										
Hollow blocks... tons	3,162	134	20,170	18,941	1,167	1,322	2,106	1,116		48,118
\$	30,208	1,120	193,335	144,471	11,965	11,781	17,055	11,737		421,672
Roofing tile.... No.				48,939						48,939
\$				3,900						3,900
Floor tile (quarries) sq. ft.				94,316						94,316
\$				21,502						21,502
Drain tile... M	71	3	545	5,886	103		130	647		7,385
\$	2,974	120	20,609	135,004	5,309		1,322	21,332		186,670
Sewer pipe, copings, flue linings, etc.... \$	92,070		83,566	466,371			112,810	58,407		813,224
Pottery, glazed or unglazed \$		24,362		67,866		4	144,903	7,726		244,861
Bentonite... tons								7		7
\$								176		176
Other clay products... \$				16,366		505		3,061		19,932
Total... \$	172,557	68,151	1,064,551	1,639,508	49,773	109,739	329,584	216,355		3,650,218
OTHER STRUC- TURAL MATERIALS										
Cement... brls.			2,210,584	1,599,342	242,112		193,571	253,112		4,498,721
\$			3,155,702	2,288,975	549,594		399,922	536,528		6,930,721
Lime.... tons	6,533	11,572	93,813	166,703	18,235		6,642	17,152		320,650
\$	35,534	109,184	587,901	1,273,230	172,110		56,577	160,001		2,394,537
Sand and gravel.... tons	423,487	569,150	3,458,128	6,994,447	440,309	362,841	734,067	1,487,513		14,469,942
\$	136,677	447,239	893,896	1,971,239	188,974	66,942	250,025	525,604		4,480,596
Slate.... tons								250		250
\$								3,750		3,750
Stone.... tons	34,661	16,805	2,246,825	1,905,138	78,423		1,428	407,642		4,690,922
\$	87,307	154,918	2,360,901	1,655,016	299,282		2,985	378,052		4,938,461
Total... \$	259,518	711,341	6,998,400	7,188,460	1,209,960	66,942	709,509	1,603,935		18,748,065
Grand Total\$	16,198,573	2,223,505	24,512,470	79,509,239	8,714,459	1,681,697	21,183,679	26,767,522	1,891,371	182,681,915

Yukon (*)—Silver produced in North West Territories included with Yukon.

(†)—Includes a small production from Fort Norman well in N.W.T.

(‡)—Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid made from waste smelter gases.

Table 2.—Quantities and Values of Mineral Products from Canadian Sources
1931 and 1932

		1931		1932		Per cent Increase (+) or Decrease (—)	
		Quantity	Value	Quantity	Value	Quantity	Value
METALLICS							
Arsenic (As ² O ³)	lb.	3,575,936	135,170	2,424,342	98,714	— 32.2	\$ 27.0
Bismuth	lb.	118,207	157,650	16,855	7,340	— 85.7	— 95.4
Cadmium	.....	.....	180,958	.....	26,824	.....	— 85.2
Chromite	tons	.....	.....	78	1,113	.....	.....
Cobalt	lb.	521,051	651,179	490,631	587,957	— 5.8	— 9.7
Copper	lb.	292,304,390	24,114,065	247,679,070	15,294,058	— 15.3	— 36.6
Gold†	fine oz.	2,693,892	55,687,688	3,044,387	62,933,063	+ 13.0	+ 13.0
Lead	lb.	267,342,482	7,260,183	255,947,378	5,409,704	— 4.3	— 25.5
Manganese ore	tons	117	2,893	.....	.....	— 100	— 100
Molybdenite	lb.	1,222	280	.....	.....	— 100	— 100
Nickel	lb.	65,666,320	15,267,453	30,327,968	7,179,862	— 53.8	— 53.0
Palladium, Rhodium, Iridium, etc.	fine oz.	46,918	1,217,717	37,613	901,890	— 19.8	— 25.9
Platinum	fine oz.	44,775	1,596,900	27,343	1,099,393	— 38.9	— 31.2
Selenium	lb.	21,500	40,850	.....	.....	— 100	— 100
Silver	fine oz.	20,562,247	6,141,943	18,347,907	5,811,081	— 10.8	— 5.4
Titanium ore	tons	1,509	10,261	.....	.....	— 100	— 100
Zinc	lb.	237,245,451	6,059,249	172,283,558	4,144,454	— 27.4	— 31.6
Total			118,524,439		103,495,453		— 12.7
NON-METALLICS—FUELS							
Coal	tons	12,243,211	41,207,682	11,738,913	37,117,695	— 4.1	— 9.9
Natural gas	M cu. ft.	25,874,723	9,026,754	23,420,174	8,899,462	— 9.5	— 1.4
Peat	tons	1,674	7,033	3,248	7,593	+ 94.0	+ 8.0
Petroleum, crude	brls.	1,542,573	4,211,674	1,044,412	3,022,592	— 32.3	— 28.2
Total			54,453,143		49,047,342		— 9.9
Actinolite	tons	35	456	.....	.....	— 100	— 100
Asbestos	tons	164,296	4,812,886	122,977	3,039,721	— 25.1	— 36.8
Barytes	.....	16	363	.....	.....	— 100	— 100
Bituminous sands	tons	1,015	4,060	343	1,372	— 66.2	— 66.2
Diatomite	tons	1,610	32,789	1,496	29,509	— 7.1	— 10.1
Feldspar	tons	18,343	186,961	7,047	81,982	— 61.6	— 56.2
Fluorspar	tons	40	620	32	464	— 20.0	— 25.3
Graphite	tons	548	32,149	346	18,483	— 36.9	— 42.5
Grindstones	tons	621	38,103	328	15,735	— 47.2	— 58.7
Gypsum	tons	863,752	2,111,517	438,629	1,080,379	— 49.2	— 48.8
Iron oxides (ochres)	tons	5,520	49,205	5,240	46,161	— 5.1	— 6.2
Magnesian dolomite	.....	.....	295,579	.....	262,860	.....	— 11.1
Manganese, bog	tons	77	462	.....	.....	— 100	— 100
Mica	tons	1,339	54,066	309	6,828	— 76.8	— 87.4
Mineral water	imp. gal.	217,408	13,324	76,714	7,170	— 64.7	— 46.2
Phosphate	tons	.....	.....	1,316	12,333	.....	.....
Quartz	tons	195,724	303,158	189,132	276,147	— 3.4	— 8.9
Salt	tons	259,047	1,904,149	263,543	1,947,551	+ 1.7	+ 2.3
Silica brick	M	900	35,746	93	4,304	— 89.7	— 88.0
Soapstone	.....	.....	34,439	.....	46,751	.....	+ 35.8
Sodium carbonate	tons	712	7,351	495	5,450	— 30.5	— 25.9
Sodium sulphate	.....	.....	421,097	.....	271,736	.....	— 35.5
Sulphur*	tons	50,107	429,457	53,172	470,014	+ 6.1	+ 9.4
Talc	tons	11,836	122,644	12,103	112,287	+ 2.2	— 8.4
Volcanic dust	tons	128	2,560	180	3,600	+ 40.6	+ 40.6
Total			10,893,111		7,740,837		— 28.9
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Brick—Soft mud process	Face..... M	5,476	116,316	6,188	108,582	+ 13.0	— 6.6
	Common..... M	41,177	619,357	12,801	182,372	— 68.9	— 70.6
Stiff mud process	Face..... M	77,135	1,752,947	30,197	644,756	— 60.9	— 62.1
(wire cut)	Common..... M	81,930	1,205,464	40,753	638,922	— 50.3	— 47.0
Dry press	Face..... M	20,149	423,357	5,222	119,547	— 72.6	— 71.8
	Common..... M	8,688	107,213	4,248	46,762	— 51.1	— 56.4
Fancy or ornamental brick	M	335	20,773	125	6,237	— 62.7	— 70.0
Sewer brick	M	2,253	43,692	643	12,156	— 71.5	— 72.2
Paving brick	M	19	682	6	155	— 68.4	— 77.3
Firebrick	M	2,248	107,597	1,580	71,757	— 29.7	— 33.3
Fireclay	tons	1,233	14,857	990	11,826	— 19.7	— 20.4
Fireclay blocks and shapes	.....	.....	83,039	.....	75,209	.....	— 9.4
Hollow blocks	tons	105,635	1,046,634	48,118	421,672	— 54.5	— 59.7
Roofing tile	No.	6,935	48,939	3,900	3,900	+ 605.7	+ 441.8
Floor tile (quarries)	sq. ft.	107,499	31,415	94,316	21,502	— 12.3	— 31.6
Drain tile	M	12,518	328,410	7,385	186,670	— 41.0	— 43.2
Sewer pipe, copings, flue linings, etc.	.....	.....	1,508,803	.....	813,224	.....	— 46.1
Pottery, glazed or unglazed	.....	.....	257,125	.....	244,861	.....	— 5.0
Bentonite	tons	187	935	7	176	— 96.3	— 81.2
Other clay products	.....	.....	171,952	.....	19,932	.....	— 88.4
Total			7,841,288		3,659,218		— 53.4
Cement	brls.	10,161,658	15,826,243	4,498,721	6,930,721	— 55.7	— 56.2
Lime	tons	344,785	2,764,415	320,650	2,394,537	— 7.0	— 13.4
Sand and gravel	tons	21,748,586	6,651,165	14,469,942	4,480,596	— 33.5	— 32.6
Slate	tons	250	5,000	250	3,750	— 0.0	— 25.0
Stones							
Granite	tons	1,190,887	2,763,050	490,822	1,110,582	— 58.8	— 58.8
Limestone	tons	6,262,430	6,305,538	3,687,241	3,227,715	— 41.1	— 48.8
Marble	tons	20,442	668,713	12,379	250,706	— 39.4	— 62.5
Sandstone	tons	924,101	1,332,883	500,480	349,458	— 45.8	— 73.8
Total			36,317,007		18,748,065		— 48.4
Grand Total			228,623,018		182,681,915		— 19.9

* Sulphur content of pyrites shipped and estimated sulphur contained in the sulphuric acid made from smelter gases.

† Includes grindstones, pulpstones and scythestones.

‡ Estimated exchange equalization on gold produced in 1931, was \$2,405,708 and in 1932 it was \$8,546,310.

ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR 1932

CHAPTER ONE

General Review.—Abnormally low prices, together with an almost world wide shrinkage in consumption of many mineral products were the predominant factors responsible for the third successive decline in the value of the annual mineral production of Canada since 1929. Declines in value were both common and persistent for metallics, non-metallics (including fuels) and structural materials throughout the past three years. These common losses appear to indicate an increasing trend towards a more sensitive and close relationship in the various spheres of modern industry. The total value of the 1932 mineral production, amounting to \$182,681,915, represents a decrease of 20 per cent as compared with \$228,029,018, the corresponding value for 1931, and 41 per cent as against \$310,850,246, the high record of 1929. These statistics are interesting when compared with those for 1920-1922, the period of the last cycle of major industrial disruption, when in 1921 the total value of the mineral production of Canada, amounting to \$171,923,342, represented a decrease of 25 per cent from that of the immediate preceding year. This was followed abruptly by an increase of 7 per cent in 1922. This rapid and pronounced recovery after such a drastic reverse demonstrated not only the solid foundations upon which the Canadian industry was founded, but also its stability and general efficiency. Statistics compiled during the first seven months of 1933 provided unmistakable evidence of improvement in some of the more important divisions of the mining industry. Increases in value of production during this period were recorded for asbestos, copper, lead, nickel and salt. These are products that occupy prominent positions in industrial life and with their diversified uses would indicate that industrial recovery has commenced on a broad and logical basis.

The total of the 1932 production represents a value of \$17.39 per capita as compared with \$21.97 in 1931, \$27.65 in 1930, and \$31.72 in 1929. These figures emphasize the very great importance of the well-being of the Canadian mining industry on the national life of the nation.

The value of metal production from Canadian ores in 1932 totalled \$103,495,453 as against a value of \$118,524,439 in 1931. The 1932 value constituted 56.7 per cent of the total value of the mineral production for the Dominion and continued to sustain for metals a premier position in the Canadian mining industry.

Fuels, including coal, natural gas, peat and petroleum, with a value of \$49,047,342 recorded a loss of 10 per cent from that for 1931. Decreases were common to all members of this group with the exception of peat, which registered a small gain. The combined value of fuels in 1932 amounted to 26.8 per cent of that for the total mineral output. The other sub-group of non-metallic minerals and including asbestos, graphite, gypsum, salt, etc., showed a production value of \$7,740,837 in 1932 as compared with a corresponding value of \$10,893,141 for the preceding year. Clay products were appraised at \$3,650,218, or 53.5 per cent below the 1931 production; cement, stone and other structural materials valued at \$18,748,065, were 48.4 per cent less than for the previous year.

Capital employed in the mining industry in Canada during 1932 amounted to \$685,211,573. This wealth, in addition to supplying operating funds for active companies, was utilized in equipping and developing the metallurgical plants and mines of the Dominion. This highly developed industry supported 61,470 employees in the operation of mines, oil fields, smelters, refineries, mills, quarries and other mineral producing agencies. Salaries and wages totalled \$71,772,049, and the value of fuel and electricity consumed aggregated \$16,476,484.

Railroad construction, colonization and the development of hydro-electric energy have contributed greatly to the well-being and advancement of the mining industry in Canada. These developments have been amply justified in the resultant increase in freight movements and expansion of markets for farm products and electrical power. It is noteworthy that railroad construction was almost directly responsible for the discovery of the Sudbury nickel ores in 1883 and the silver ores of the Cobalt mining camp in 1903. The increasing importance of mineral wealth to the nation has been especially emphasized in the opening up and working of our various coal fields, in the development of the asbestos mines of Quebec, the mining and metallurgical developments in the same province by Noranda mines, the tremendous expansion of mining, smelting and refining in the nickel-copper industry in Ontario, the mining and smelting of copper ores in Manitoba and British Columbia and in the mining and treatment of the silver-lead-zinc ores of the Sullivan, a world-noted mine located in the southern part of the latter province. In addition to these developments is the remarkable growth of the Canadian gold mining industry as particularly evidenced in the Porcupine and Kirkland Lake camps of Ontario.

In 1886 mineral production in the Dominion amounted to \$10,000,000 or approximately \$2.23 per capita. Following the sensational placer gold discoveries in the Yukon in 1896 and 1897, production amounted to \$66,000,000 or \$12.16 per capita. A steady increase in the value of mineral production is recorded from 1904 to 1929, with the exception of some temporary declines during immediate post-war years. The serious reverses experienced during the recent depression are considered of a transitory nature, and the return of normal or stable trade conditions and an expanding demand for new and improved manufactures will undoubtedly stimulate the flow of wealth from the mines and metallurgical plants of the nation, a flow of wealth that has already established Canada as first in the production of asbestos and nickel, second in gold, zinc, gypsum and cobalt, third in copper and silver and fourth in lead.

Metallics.—Metallic mineral production totalled \$103,495,453 in 1932 as compared with \$118,524,439 in 1931 and \$142,743,764 in 1930.

Arsenic (As_2O_3) production amounted to 2,424,342 pounds valued at \$98,714 as compared 3,575,936 pounds valued at \$135,170 in 1931; this came entirely from silver-cobalt-arsenic ores mined in Ontario and treated at Deloro, Ontario, by the Deloro Smelting and Refining Company, Ltd.

Bismuth output in Canada in 1932 totalled 16,855 pounds valued at \$7,340 as compared with 118,207 pounds worth \$157,650 in 1931 and 12,732 pounds at \$6,366 in 1930. The production for 1932 consisted of the metal contained in silver-lead-bismuth bullion exported by the Deloro Smelting and Refining Co., Ltd., Deloro, Ontario, and metallic bismuth produced in British Columbia by the Consolidated Mining and Smelting Company of Canada, Ltd.

Cadmium was produced commercially for the first time in Canada in 1928. During 1932 the output consisted of the metal recovered as a by-product in the production of refined zinc at the Trail refinery in British Columbia by the Consolidated Mining and Smelting Company of Canada, Ltd. The Canadian output for the year was valued at \$26,824 as compared with \$180,958 in 1931 and \$337,871 in 1930. In addition to this actual production of the metal, the Hudson Bay Mining and Smelting Co., Ltd., treated 1,417 tons of cadmium precipitate at Flin Flon, Manitoba, from which was produced a high grade cadmium sponge containing 57,397 pounds of metallic cadmium.

Cobalt at 490,631 pounds and valued at \$587,957 represented the 1932 production of the metal in Canada. This was all contained in silver-cobalt-arsenic ores mined in Ontario; the output for 1931 totalled 521,051 pounds worth \$651,179, while that for 1930 amounted to 694,163 pounds at \$1,144,007. This decrease during recent years was occasioned largely through the curtailment in mining of silver-cobalt ores owing to the extremely low price for silver, to depletion of ore reserves and to the general industrial depression.

Copper recovered in 1932 as primary metal or contained in ores or concentrates exported amounted to 247,679,070 pounds valued at \$15,294,058, as compared with 292,304,390 pounds worth \$24,114,065 in 1931 and 303,478,356 pounds at \$37,948,359 in 1930. The Canadian copper industry continued to suffer extensively from adverse trade conditions and low prices

for the metal. In no previous year was the price of copper as low as in 1932, the average for the year being 5.555 cents per pound, while in London the average price transposed into Canadian funds was 6.3802 cents per pound. Recorded copper production in 1932 was confined to the provinces of Quebec, Ontario, Manitoba and British Columbia. The copper output in Quebec came from the metal contained in concentrates exported from Eustis by the Consolidated Copper and Sulphur Co. Ltd., and that contained in blister or anode copper produced by Noranda Mines, Ltd. In Ontario copper came almost entirely from the copper-nickel ores mined in the Sudbury district by the International and Falconbridge copper-nickel mining companies. Manitoba's production was derived from the mining and smelting of copper ores by the Hudson Bay Mining and Smelting Co. Ltd., while in British Columbia the greater part of the output was derived from the mining and smelting of copper ores at Anyox by the Granby Consolidated Mining, Smelting & Power Co., and from concentrates exported from the Britannia mine.

Gold production from all primary sources in Canada during 1932 totalled 3,044,387 fine ounces valued at \$62,933,063 as compared with 2,693,892 fine ounces worth \$55,687,688 in 1931 and 2,102,068 fine ounces at \$43,453,601 in 1930. The quantity of gold produced in 1932 represents an increase of 13 per cent over 1931 as compared with an increase of 28.2 per cent recorded for the 1931 output over that for 1930. The production by provinces was as follows:—Nova Scotia, 964 fine ounces; Quebec, 401,105 fine ounces; Ontario, 2,280,105 fine ounces; Manitoba, 122,507 fine ounces; Saskatchewan, 11 fine ounces; Alberta, 83 fine ounces; British Columbia, 199,004 fine ounces, and the Yukon, 40,608 fine ounces. Sources of fine gold production by percentages in 1932 were—in alluvial gold, 1.8 per cent, in crude gold bullion, 79.3 per cent, in base bullion, 1.00 per cent, in blister copper, 15.10 per cent, in ores, matte, slags, etc., exported, 2.8 per cent. The 1932 Canadian gold production constitutes, for the third consecutive year, a new high record for the gold mining industry of the Dominion. Gold for the past two years has been Canada's most valuable mineral product, even surpassing coal which retained this premier position for so many years. International repatriation of credits on a large scale forced Great Britain off the gold standard in 1931; this suspension of specie payments by Great Britain has since been followed by a pronounced discount of the Canadian dollar in New York and has proven of very great benefit to the Canadian gold miner. In order to meet maturing obligations abroad the Canadian government took steps to purchase the gold production of the larger Canadian mines and after October, 1931, exports of gold from Canada were permitted only under licence. The amount of equalization exchange (premium) paid by the Canadian government on newly mined Canadian gold purchased during 1932 amounted to \$7,706,509.

Lead contained in ores mined in Canada in 1932 amounted to 255,947,378 pounds valued at \$5,409,704 as compared with 267,342,482 pounds at \$7,260,183 in 1931. This decrease of 4.3 per cent in quantity reflects a continuation of extremely low prices for the metal and a lessened demand by the lead consuming industries. Metal from the Trail plants of the Consolidated Mining and Smelting Co. of Canada, Ltd., continues to form the greater part of the annual lead production of Canada. The total tonnage produced in 1932 at the famous Sullivan mine in British Columbia amounted to 1,447,448 tons comprising 6,403 tons of crude ore shipped to Tadanac and 1,441,045 tons of lead-zinc ore to the concentrator at Kimberley, being 173,695 tons less than in 1931. In the matter of ore production it might be of interest to note that the Sullivan mine has produced to December 31, 1932—55,184,466 ounces of silver, 3,192,306,997 pounds of lead and 2,522,946,412 pounds of zinc. The company reports that Empire preference, effective as from the 1st of March, 1932, materially increased the sale and distribution of their lead and zinc in the United Kingdom.

Nickel output in 1932 totalled 30,327,968 pounds valued at \$7,179,862 as compared with 65,666,320 pounds worth \$15,267,453 in 1931 and 103,768,857 pounds at \$24,455,133 in 1930. The 1932 production represents a decline of 53.8 per cent in quantity and 53.0 per cent in value from the preceding year and 70.8 per cent in volume and 70.6 per cent in value from 1930. This persistent falling off in nickel output during recent years is but consistent with the declining production of practically all other industries and not only reflects the strongly entrenched position which the metal had attained under normal conditions but emphasizes its widespread and almost phenomenal adoption in industry and art. Practically all of the nickel produced in Canada comes from the copper-nickel bearing deposits of the Sudbury district in Ontario. Two companies operated mines and metallurgical plants in this area during 1932. The International

Nickel Company of Canada, Ltd., conducted smelting operations at Copper Cliff and Coniston, Ontario, while Falconbridge Nickel Mines Ltd., smelted their ores at the Falconbridge mine located a few miles east of Sudbury. This company ships matte to Norway for refining while the International Nickel Company conducts refining operations at Port Colborne, Ontario. The relatively small amount of nickel oxide produced by the Deloro Smelting and Refining Co. Limited is recovered from silver-cobalt-arsenic ores mined in Northern Ontario.

Silver obtained as a primary metal from all sources in Canada during 1932 totalled 18,347,907 fine ounces valued at \$5,811,081 as compared with 20,562,247 fine ounces worth \$6,141,943 in 1931 and 26,443,823 fine ounces at \$10,089,376 in 1930. Producers of both silver-lead and cobalt-silver ores in Canada during 1932 continued to suffer from the almost unprecedented low prices for silver, lead and zinc and it was of great credit to the mining companies and smelters mining and treating these ores that operations were so generally continued and much needed employment provided. The sources of Canadian silver production by percentages for 1932 were—in silver-cobalt ores, 28.5 per cent; in base bullion, 29.2 per cent; in gold ores, 2.5 per cent; in blister copper, 15.5 per cent, and in matte, copper ores and silver-lead ores exported, 24.3 per cent. British Columbia and Ontario are the two largest silver producing provinces, the former in 1932 contributing 39.7 per cent and the latter, 34.5 per cent of the total output for the Dominion. Silver prices on the New York exchange in 1932 ranged from a high of 30.136 cents per fine ounce for the February average to a low of 25.010 for the month of December. The average yearly price of silver, in Canadian funds, computed from daily New York quotations, was 31.67163 cents per troy ounce. Handy and Harmon in a review of the silver market for 1932 state that the paramount factor affecting silver during 1932 was the tremendous shrinkage in demand from the Orient. During 1932 although world production declined to approximately 160,000,000 ounces, India and China consumed only 52,000,000 ounces or 32 per cent; the normal absorption by these countries is about 75 per cent.

Zinc production in 1932 amounted to 172,283,558 pounds valued at \$4,144,454 as compared with 237,245,451 pounds worth \$6,059,249 in 1931 and 267,643,505 pounds at \$9,635,166 in 1930. Zinc, in common with most other base metals, suffered from the general decline in metal prices during 1932. The prices for zinc were lower during the summer months than at the beginning of the year and the average December quotations showed a slight improvement over those for January. The London price of zinc, on the basis of which the greater part of the Canadian production is sold, when converted to Canadian funds averaged 2.4056 cents per pound in 1932 as compared with a corresponding price of 2.554 cents in 1931 and 3.6 cents in 1930. As in 1931, the total production of primary zinc in the Dominion during 1932 consisted of the refined zinc produced by the Consolidated Mining and Smelting Company at Trail, British Columbia, and by the Hudson Bay Mining and Smelting Co. Ltd., at Flin Flon, Manitoba.

Fuels and Other Non-Metallics.—This division of the Canadian mineral production, including among its more important items, coal, natural gas, petroleum, asbestos, gypsum and salt, realized in 1932 a valuation of \$56,788,179 as compared with \$65,346,284.

Fuels.—Coal production in Canada during 1932 declined 4.1 per cent to a total of 11,738,913 tons and the value of this output at \$37,117,695 represents a decrease of 9.9 per cent from that for the preceding year. The 1932 output included 7,714,279 tons of bituminous coal, 560,902 tons of sub-bituminous coal and 3,463,732 tons of lignite coal. Nova Scotia mines produced 4,084,581 tons of coal, a decline of 17.6 per cent from the 1931 total of 4,955,563 tons. New Brunswick production advanced 16.7 per cent to 212,695 tons while in Saskatchewan the output of 887,139 tons established a new high record for that province. An increase of 6.7 per cent was recorded in the tonnage of coal mined in Alberta during the year, the 1932 output being 4,870,648 tons as against 4,564,015 tons in 1931. Coal production from British Columbia mines decreased 10.4 per cent to 1,681,490 tons, the tonnage in the preceding year being 1,876,406. Minor tonnages of coal were produced during 1932 in Manitoba and the Yukon.

Although the total Canadian output was less than in the previous year considerable progress was made in the marketing of Canadian coal in areas hitherto supplied to a large extent with imported coal. This improved situation was due in the main part to the assistance provided by the Federal Government to aid the sale of Canadian coal in these highly competitive markets.

Peat shipments by Canadian producers in 1932 were recorded at 3,248 tons valued at \$7,593 as compared with 1,674 tons at \$7,033 in 1931. The 1932 production was obtained from the St. Hyacinthe bog, Quebec, and from bogs at Alfred, Chesterville and Morewood, Ontario.

Natural gas production in Canada during 1932 amounted to 23,420,174 thousand cubic feet, a 9.5 per cent recession from the output of 25,874,723 thousand cubic feet in 1931. Declining industrial demand and a further curtailment in drilling activities in the Turner Valley field, Alberta, were chiefly responsible for the decreased production during the year. Alberta wells produced 65.6 per cent of the total 1932 Canadian output; Ontario wells, 31.6 per cent, and New Brunswick wells, 2.8 per cent.

Petroleum in the crude form was produced from wells in New Brunswick, Ontario and Alberta. The 1932 production at 1,044,412 barrels represents a 32.3 per cent decrease from the output of 1,542,573 barrels in 1931. Decreased production in the Turner Valley field, Alberta, was the principal factor contributing to this decline and was occasioned by a lessened demand for crude naphtha and a conservation of natural gas. The successful operation of a small refining plant near Fort Norman, in the Mackenzie river district, Northwest Territories, was an interesting feature of the year; crude oil from a nearby well, capped since 1925, was treated at this refinery and provided fuel for the development of silver-radium ores occurring to the east at Great Bear Lake.

Other Non-Metallics.—Asbestos sales fell to 122,977 tons valued at \$3,039,721 in 1932 as compared with 164,296 tons worth \$4,812,886 in 1931, a decrease of 37 per cent in value and 25 per cent in volume. Compared with the figures for 1930 the decrease was still more pronounced, being 49 per cent in tonnage and 64 per cent in value. The tonnage of the shipments of asbestos in 1932 came entirely from Quebec mines and was the lowest recorded since 1921 and represented the lowest annual value since 1914. The average price for the year was the lowest in the history of the Quebec asbestos mining industry. Asbestos exports dropped from 70,903 tons valued at \$3,929,317 in 1931 to 42,661 tons at \$2,115,140 in 1932. Exports of asbestos sand and waste and asbestos manufactures also registered serious declines in 1932.

Gypsum production from properties in Nova Scotia, New Brunswick, Ontario, Manitoba and British Columbia in 1932 amounted to 438,629 tons valued at \$1,080,379 as compared with 863,752 tons worth \$2,111,517 in 1931, a decrease of 49.2 per cent in quantity and 48.2 per cent in value. Gypsum quarried during the year totalled 439,695 tons of which 80,755 tons or 18.4 per cent was calcined in Canada. At present a considerable tonnage of anhydrite is exported from Nova Scotia and the statistics relating to this output are combined with those for gypsum.

Salt output in Canada during 1932 totalled 263,543 tons valued at \$1,947,551 as compared with 259,047 tons worth \$1,904,149 in 1931. This represents an increase of 1.7 per cent in quantity and 2.3 per cent in value and not only emphasizes the sound basis upon which this Canadian industry is established but reflects great credit to the salt producers of the Dominion in being able to record progress throughout such a period of adverse industrial conditions. During 1932 salt was produced in Nova Scotia, Ontario and Manitoba. The first official statistics of systematic salt production on a commercial scale in Manitoba were recorded in 1932 when the Neepawa Salt Company reported production for the first time; at Simpson, in Saskatchewan, the Simpson Oil Company were reported to be preparing to produce salt in 1933.

In the non-metallic group are several other minerals of economic importance. These are largely represented by sulphates, carbonates, silicates and various rock forming minerals. Shipments of Canadian feldspar during 1932 amounted to 7,047 tons valued at \$81,982 as compared with an output of 18,343 tons worth \$186,961 in 1931 and 26,796 tons at \$268,469 in 1930. The total output in 1932 came from the provinces of Quebec and Ontario. Mica production in Canada in 1932 amounted to 309 tons valued at \$6,828 as compared with 1,339 tons worth \$54,066 in 1931 and 1,170 tons at \$96,004 in 1930. The total mica production in 1932 came from deposits in Quebec and Ontario; unsatisfactory conditions in general industry and more especially in the field for the manufacture of electrical equipment, were responsible for the almost continuous decline in Canadian mica production during recent years. Decreases in volume of production during 1932 were recorded for actinolite, bituminous sands, diatomite, fluorspar, graphite, grindstones, iron oxides (ochres), magnesitic dolomite, natural mineral waters, quartz, silica brick, sodium carbonate and sodium sulphate while increases were registered for phosphate, soapstone, sulphur, tale and volcanic dust.

Clay Products and other Structural Materials.—In 1932, as in 1931 and 1930, there was a distinct curtailment in general production of structural materials and the 1932 output, as compared with the previous year, revealed losses in the value of all items in these groups with the exception of roofing tile. The value of domestic clay and clay products made from Canadian clay sold by Dominion producers in 1932 declined 53 per cent below that for the preceding year and 65 per cent below 1930. Sales in 1932 reached a total value of \$3,650,218 as against \$7,841,288 in 1931. Of the value of the total domestic clay products output, Ontario produced 45 per cent; Quebec, 29 per cent; Alberta, 9 per cent; and the other provinces in the order of their output value, were—British Columbia, Nova Scotia, Saskatchewan, New Brunswick and Manitoba. Cement shipments in 1932 from plants located in Quebec, Ontario, Manitoba, Alberta and British Columbia totalled 4,498,721 barrels valued at \$6,930,721 as compared with 10,161,658 barrels worth \$15,826,243 in 1931. Quebec mills produced 49.1 per cent of the total Canadian shipments; Ontario, 35.6 per cent; Manitoba, 5.4 per cent; Alberta, 4.3 per cent; and British Columbia, 5.6 per cent. Sand and gravel output in Canada in 1932 totalled 14,469,942 tons valued at \$4,480,596 as compared with 21,748,586 tons at \$6,651,165 in 1931. Of the 1932 production Nova Scotia contributed 423,487 tons; New Brunswick, 569,150 tons; Quebec, 3,458,128 tons; Ontario, 6,994,447 tons; Manitoba, 440,309 tons; Saskatchewan, 362,841 tons; Alberta, 734,067 tons, and British Columbia, 1,487,513 tons. Canadian production of lime, including both quick and hydrated, amounted to 320,650 tons valued at \$2,394,537 in 1932 as compared with 344,785 tons worth \$2,764,415 in 1931 and 490,802 tons at \$4,038,698 in 1930. Stone shipments from Canadian quarries during 1932 totalled 4,690,922 tons valued at \$4,938,461 as compared with 8,397,860 tons worth \$11,070,184 in 1931 and 9,994,506 tons at \$13,034,209 in 1930. Production in 1932 consisted of 490,822 tons of granite, 3,687,241 tons of limestone, 12,379 tons of marble and 500,480 tons of sandstone. In addition to these outputs 250 tons of slate were shipped from a property in British Columbia. Limestone, which constituted 79 per cent of the total quantity of stone produced, came from quarries operated in every province with the exception of Saskatchewan and Prince Edward Island.

The Provinces and Territories

Nova Scotia in 1932 produced mineral wealth to the value of \$16,198,573 or 8.9 per cent of the total for the Dominion. As in the previous year Nova Scotia ranked fifth in importance as a mineral producing province and in 1932 was first in the production value of coal, diatomite and gypsum. Coal, as for many years past, was the most important item in the mineral production of Nova Scotia. This product in 1932 totalled 4,084,581 tons valued at \$15,167,793 as compared with 4,955,563 tons worth \$19,016,720 in 1931. Relatively small quantities of gold were produced in 1932 at various mines located throughout the province.

New Brunswick's production of minerals in 1932 amounted in value to \$2,223,505 as compared with \$2,176,910 in 1931 and constituted 1.2 per cent of the Dominion total. This province is chiefly a producer of non-metallic minerals and during the year shipped or produced coal, natural gas, petroleum, grindstones, gypsum, clay products, lime, sand and gravel, and stone. The increase in coal production from 182,181 tons in 1931 to 212,695 tons in 1932 may be accounted for by a better demand by the railways, the use of coal in the New Brunswick power plant, its satisfactory use in factories, and a fair demand for domestic purposes.

Quebec, with a mineral production amounting to \$24,512,470 in 1932, contributed, 13.4 per cent of the total value for Canada and ranked third in importance in provincial output of mine products. Metals as a group still retain the premier position in the Quebec mining industry, the value of the 1932 metal production totalling \$12,788,089 as compared with \$12,094,930 in 1931. An increased gold production was the chief factor contributing to the greater value of metal output. Pronounced recessions in value were common to the clay products and structural materials group and to the non-metals group, excepting pyrites; these reflect the general lessened demand for commodities consumed by the manufacturing industries or utilized in construction.

Ontario's mineral production in 1932 was valued at \$79,509,239 and comprised 43.5 per cent of that for the Dominion. In 1931 the corresponding value was \$96,113,235. Decreases from 1931 were common to all the major mineral groups with the exception of fuels which registered a slight increase in value. The most pronounced feature of the 1932 mining activities in Ontario

was the expansion in gold mining and more especially by those properties operating in the Kirkland Lake and Porcupine camps; the value of gold produced in Ontario amounted to \$47,133,952 as compared with \$43,117,600 in 1931 and \$35,886,552 in 1930. Decreases in nickel and copper outputs were largely responsible for the drop in value of metals as a group and were the direct result of low prices or shrinkage in industrial demand. A smaller production of clay products and various structural materials resulted from lessened activities in construction and the building trades.

Manitoba's mines and associated mineral industries yielded 4.8 per cent of the value of the total Canadian mineral production in 1932. This output amounted to \$8,714,459 in value as against \$9,965,854 in 1931. Decreases were generally recorded for all but members of the metallic group which showed value increases for zinc, silver, and gold. The quantity of copper produced in the province was higher than for the previous year, however, the extremely low price for the metal resulted in a decrease in total value from that for 1931. The mining and smelting of copper-gold-zinc ores at Flin Flon comprised the most important operations in the Manitoba mining industry in 1932. The first official statistics of systematic salt production on a regular commercial scale in Manitoba were recorded in 1932; the mineral was recovered at Neepawa.

Saskatchewan's mining industry in 1932 reported a total output valued at \$1,681,697 or 0.9 per cent of that for the Dominion. This was a considerable decrease from the value of \$1,931,880 in 1931 and resulted largely from a pronounced falling off in the sales of sodium sulphate, clay products and sand and gravel. Coal mined in 1932 totalled 887,139 tons valued at \$1,229,449 and established a new high record for the province. It is noteworthy that in 1932 the first regular and official statistics were compiled showing a metal production for Saskatchewan, gold and silver being reported as contained in ores shipped from properties located in the northern part of the province.

Alberta in 1932 reported a mineral output valued at \$21,183,079 as compared with \$23,580,727 in 1931; the value of the products of the mines, clay products plants, quarries, etc., located in this province comprised 11.6 per cent of the total for Canada. Losses, as compared with 1931, were experienced in all of the principal mineral producing groups, these being quite pronounced for fuels and structural materials. Coal production valued at \$13,526,309 represents an increase over that for the preceding year and the recession in the total value of fuels resulted from the lessened production of natural gas and petroleum.

British Columbia with a mineral production valued at \$26,767,522 in 1932 ranks second among the mineral producing provinces of Canada and the value of its mineral wealth now comprises 14.7 per cent of that for the Dominion. Distinct losses were suffered during 1932 in all of the major mineral groups. Metal mining, the most important division in the British Columbia industry, recorded a decline from \$23,773,085 in 1931 to \$18,146,964 in 1932. Value of coal production fell from \$7,150,996 in 1931 to \$6,392,801; and severe losses were recorded for clay products and structural materials, including cement, lime, sand and gravel, and stone. The interest directed to gold mining, both lode and placer, resulted in increased prospecting and development of gold-bearing deposits, and in the southern part of the province the Consolidated Mining and Smelting Co. of Canada conducted mining and smelting operations in a remarkably successful manner, notwithstanding extremely adverse market conditions.

Yukon mineral production in 1932 totalled \$1,891,371 as compared with \$2,145,347 in 1931; the value in 1932 was 1 per cent of the total for the Dominion. Mine products for the year under review consisted of gold, silver, lead and coal; gold was recovered from alluvial deposits by both hand and dredging methods, and silver-bearing lead concentrates were produced in the Mayo district and exported for smelter treatment. A permanent shut down of the Wernecke mill by the Treadwell Yukon Company followed complete exhaustion of all commercial ore in the Lucky Queen, Ladue and Sadie properties.

Franklin, Keewatin and Mackenzie, constituting the Northwest Territories of Canada and exclusive of Hudson and Ungava Bays, comprise an area of 1,309,682 square miles, or greater than that of British India. Metal bearing deposits, although little developed, are known to occur in different areas; in 1932 a small production of crude petroleum was obtained from a well drilled several years ago at Fort Norman on the lower Mackenzie river and at Echo Bay, Great Bear

Lake, the first commercial shipments of silver-radium ores were made. These metal deposits, containing native silver, pitchblende and other rare and valuable minerals were under active development in 1932. Access to these remote areas has been greatly facilitated during recent years by improvements in transportation methods and more especially by the adoption of passenger and freight carrying aeroplanes.

Industrial Review

Industrial data relating to the mining industry in Canada reveal that operating mines, smelters, metal refineries, oil and gas fields, clay products plants, cement mills, sand and gravel properties and stone quarries represented a total capital investment of \$685,211,573 in 1932 as compared with \$842,060,020 in 1931. Information relating to operations in the mining industry during 1932 collected from operators showed that the entire mining industry afforded employment to 61,470 persons, who received in salaries and wages a total of \$71,772,049. Net sales of mineral products amounted to \$196,578,211; this value represents the proceeds from sales and includes the value added by smelting operations and should not be confused with the value of Canadian mineral production for 1932 as given in the half-yearly report issued by this department or as shown as a grand total on page 14 of this publication. This latter value, amounting to \$182,681,915, includes the value of the metals computed in Canadian funds at average prices in recognized world markets together with the declared value of sales of non-metals and structural materials. It is to be noted, however, that in computing the value for metals, gold is evaluated at \$20.671834 per fine ounce.

The total cost of fuel and electricity consumed in the mining industry in Canada during 1932 was \$16,476,484 as compared with \$21,509,348 in 1931. These figures do not include the coke and coal used in non-ferrous smelting operations which fuel amounted to \$2,635,352 in 1932 as against \$2,634,850 in 1931.

Surveys conducted by the Bureau show that of the major groups in the industry, metal mining reported 330 active plants with \$269,180,464 as a capital investment, 21,931 employees, \$34,983,704 in salaries and wages, and \$119,790,072 in income from sales. In comparison with corresponding returns for both 1930 and 1931 gold mining has been the only individual member of this group to record an increase in the value of net sales. The significance of this is emphasized in the increasing activity and general expansion in all branches of gold mining, including production, development, and exploration and more especially in the investigation of low grade gold-bearing deposits heretofore considered of doubtful economic importance.

Producers of primary base metals, including copper, nickel, lead and zinc have been confronted since 1930 with possibly the most distressing market conditions within the history of metal mining. Prices at unprecedented low levels combined with a continuation of depressed industrial activities in 1932 necessitated, in some instances, a drastic curtailment in metal output resulting in lessened employment and serious loss of purchasing power in some of the more adversely affected districts. Most Canadian base metal producers have been able, through increased efficiency, to reduce mining costs to a level that permitted of steady operation and the successful disposal of their products in the highly competitive markets of the world. The miners of Canadian copper ores have, in some instances, been fortunate in operating on ores containing relatively high precious metal values. This has also proven of great assistance in preserving continuous operations and providing much needed employment.

Returns for 1932 from the non-metal mining and structural materials industries and including statistics on coal, natural gas, petroleum, asbestos, clay products, cement, gypsum, lime, sand and gravel and stone reveal on the whole a general recession from those for 1931.

Information relating to capital employment, wages, etc., as collected from industries constituting the non-metallics group and including those for fuels shows, for the most part, decided and widespread declines which are consistent with those generally experienced by other industries in Canada and in foreign countries. These groups reported 7,246 plants in operation, \$302,294,837 in capital invested, 31,654 employees, \$29,918,319 in salaries and wages, \$4,497,602 for fuel and electricity and \$54,389,856 as net value of sales.

In the clay products industry employment declined from 3,259 in 1931 to 1,740 in 1932, salaries and wages from \$3,541,250 to \$1,576,586, and the value of fuel and electricity used from \$1,486,438 to \$579,803. The cement, lime, sand and gravel, and stone industries recorded declines in employment from 10,041 in 1931 to 6,145 in 1932, salaries and wages from \$10,567,528 in 1931 to \$5,293,440 in 1932, and fuel and electricity from \$4,811,713 in 1931 to \$2,847,616 in 1932.

The close and sympathetic relationship existing between structural materials production and construction is emphasized in a comparison of the above figures with the value of contracts awarded in Canada. Data relating to contracts as compiled by the MacLean Building Reports Ltd. show a value for contracts of \$132,872,400 in 1932 as against \$315,482,000 in 1931, \$456,999,600 in 1930, and \$576,651,800 in 1929.

While these figures reveal a large decrease from 1929, it should be realized that 1929 witnessed the greatest building "boom" in the history of Canada, construction in that year being 22.1 per cent in excess of 1928, the second highest year ever recorded for this industry. The average index number of building and construction materials fell to 77.6 for 1932 (1926 = 100) since 1926 the index has staggered downward; for the succeeding five years it reads—97, 98, 99, 92 and 82.

Imports and Exports.—Imports into Canada, during the calendar year 1932, of minerals and allied products reached a total value of \$212,553,854 as compared with \$292,300,919 in 1931 and \$493,634,385 in 1930. These consisted of iron and its products valued at \$67,708,155, non-ferrous metals and products worth \$21,642,924; non-metallic minerals and their products valued at \$95,341,195, and chemicals and allied products worth \$27,861,580. In the previous year imports of iron and its products were valued at \$116,209,368; non-ferrous metals, \$38,666,648; non-metallic minerals, \$106,087,909 and chemicals and allied products, \$31,336,994. Exports of similar products during 1932 possessed a value of \$85,147,037 as compared with \$118,753,813 in 1931 and \$202,514,838 in 1930. The 1932 exports of iron and its products were valued at \$16,325,772 as compared with \$19,086,492 in 1931 and \$47,565,525 in 1930; non-ferrous metals, at \$48,130,177 as against \$73,841,502 in 1931 and \$115,766,626 in 1930; non-metallic minerals (including fuels) at \$9,657,909 as against \$14,976,873 in 1931 and \$22,862,181 in 1930, and chemicals and allied products, \$11,033,179 as compared with \$10,848,946 in 1931 and \$16,320,506 during the year ending December 31, 1930.

An analysis of Canada's external trade in these four groups during 1932 shows that the value of these imports from the United States amounted to \$154,728,391 or 72.8 per cent of the total imports from all foreign sources; the corresponding percentage for 1931 was 79; \$33,201,387 or 15.6 per cent of the value of mineral imports represents goods from the United Kingdom as compared with 11 per cent in 1931, the balance of these products entering the country in 1932 was derived from other countries some of which were—Belgium, Germany, France, Sweden, Colombia, Peru, Venezuela, Netherlands, Japan, China, Morocco, British South Africa, India, Mexico, Finland, Norway and Czechoslovakia.

Of \$85,147,037, the total value of exports of these same groups, \$30,997,334 or 36.4 per cent went to the United States as compared with 49 per cent in 1931, \$24,475,542 or 28.7 per cent to the United Kingdom and the remainder to various other countries, some of which were: France, Germany, Belgium, Italy, Australia, New Zealand, British Africa, Japan, China, Norway, British West Indies, Argentina, Netherlands, Mexico and Peru.

The largest items among Canada's exports of iron and its products in 1932 were automobiles and automobile parts valued at \$7,092,000 as compared with \$6,600,000 in 1931 and \$20,400,000 in 1930; farm implements at \$1,524,000 as against \$2,889,000 in 1931 and \$10,300,000 in 1930; among the non-ferrous metal exports, gold, silver and platinum in the form of bullion and ore, were valued at approximately \$61,731,000 as compared with \$56,341,000 in 1931; nickel in its various forms, \$7,284,000 as compared with \$14,182,000 in 1931; pig lead and lead in ore, etc., \$3,418,000 as against \$4,660,000 in 1931; copper in ore, blister, scrap, ingots, rods, wire, etc., \$16,232,000 as compared with \$17,156,000 in the preceding year; zinc spelter, scrap, etc., \$3,863,000 as against \$5,565,000 in 1931; and aluminium in bars, blocks, scrap and manufactures, \$3,903,000 as compared with \$4,495,000 in 1931.

Among the exports of the non-metallic mineral products those of asbestos and asbestos products totalled \$3,177,000 as compared with \$5,286,000 in 1931; coal exports amounted to \$1,433,000 as against \$1,910,000 in 1931; petroleum and petroleum products exported were appraised at \$1,289,000 as compared with \$1,836,000 during the previous year; exports of natural abrasives and crude artificial abrasives, including carborundum, totalled \$980,000 as compared with \$1,996,000 in 1931; and crude gypsum exports amounted to \$470,247 as against \$741,376 for the preceding calendar year.

The more important items exported in the chemicals and allied products group were soda and sodium compounds, \$2,712,658 as against \$2,852,122 in 1931; acids, \$1,872,310 as compared with \$1,968,646 for the previous year; cyanamide, \$1,652,910 as compared with \$1,507,879 in 1931; ammonium sulphate, \$701,707 as against \$167,477 for 1931; and cobalt oxides and cobalt salts, \$389,998 as compared with \$416,995 for the preceding year.

Prices.—Moderately reduced quotations for non-ferrous and non-metallic minerals caused the index for articles of mineral origin—raw and partly manufactured—calculated on the 1926 base, to fall from 81·8 in 1931 to 81·3 in 1932. From 83·1 in January this index gradually declined to 80·9 in July, rose to 81·1 in August, and closed the year at the slightly higher level of 81·2. The index for the non-ferrous metals group moved down from 64·6 in 1931 to 59·0 in 1932, declines for copper, antimony, lead and zinc outweighing gains for silver and tin. Non-metallic minerals fell from 86·5 to 85·5 chiefly because of lower prices for asbestos.

Fine silver at New York, reckoned in Canadian funds, averaged 31·7c. per ounce in 1932 as against 30·0c. per ounce in 1931. Electrolytic domestic copper fell from \$10·01 to \$7·52 per 100 pounds, carlots, f.o.b. Montreal. Domestic lead, quoted on the same basis, declined from \$4·17 to \$3·51 and domestic zinc prime, western or g.o.b. grades moved down from \$3·96 to \$3·72 per 100 pounds. Tin ingots rose from 28·1c. to 29·4c. per pound, f.o.b. Toronto. In the non-metallic group, crude asbestos No. 1 fell from \$466·67 to \$450·00 and crude No. 2 from \$241·67 to \$200·00 per ton, f.o.b. mine. Spinning stocks dropped from \$135·00 to \$110·00 per ton, f.o.b. mine. The index for Petroleum Products was somewhat higher at 74·6 in 1932, as compared with 73·0 in 1931. Mid-continent crude oil rose from \$2·37 to \$2·92 per barrel f.o.b. Sarnia and Salt Creek advanced from \$2·58 to \$3·17 per barrel f.o.b. Regina. Motor gasoline, tank wagon, was quoted at the following prices at various Canadian centres:—Halifax 20·0c., Montreal 17·6c., Toronto 17·9c., Winnipeg 20·2c., Regina 24·2c., Calgary 21·7c., and Vancouver 20·0c. per gallon.

Table 3.—Exchange Table Showing Average Monthly Quotations for New York Funds at Montreal, 1928-1932

Month	1928	1929	1930	1931	1932
	\$	\$	\$	\$	\$
January.....	1·0018	1·0027	1·0134	1·0020	1·1735
February.....	1·0019	1·0038	1·0060	1·0002	1·1452
March.....	1·0000	1·0060	1·0021	1·0002	1·1177
April.....	0·9997	1·0076	1·0004	1·0004	1·1124
May.....	1·0009	1·0068	1·0017	1·0005	1·1307
June.....	1·0024	1·0083	1·0000	1·0026	1·1533
July.....	1·0021	1·0049	0·9914	1·0032	1·1479
August.....	1·0000	1·0056	0·9990	1·0030	1·1422
September.....	0·9996	1·0076	0·9984	1·0429	1·1079
October.....	1·0003	1·0144	0·9989	1·1237	1·0961
November.....	0·9999	1·0157	0·9989	1·1234	1·1482
December.....	1·0021	1·0078	1·0023	1·2105	1·1544
Average.....	1·0009	1·0076	1·0015	1·0427	1·1358

Table 4.—Metal Prices, 1928-1932

Metal	Market	Unit	1928	1929	1930	1931	1932
Antimony (ordinaries).....	New York.....	Pound.....	0-10305	0-08956	0-07667	0-06720	0-05592
Arsenic, white.....	New York.....	Pound.....	0-04	0-04	0-04	0-045	0-04
Cobalt.....	New York.....	Pound.....	2-63	2-52	2-50	2-50	2-50
Cobalt oxide.....	New York.....	Pound.....	2-10	2-10	2-00	1-75	1-35
Copper.....	New York.....	Pound.....	0-14570	0-18107	0-12982	0-08116	0-05555
	Montreal.....	Pound.....	0-16402	0-19978	0-1498	0-10006	0-07516
	New York.....	Pound.....	0-06305	0-06833	0-05517	0-04243	0-03180
Lead.....	Montreal.....	Pound.....	0-0606	0-06678	0-05496	0-04168	0-03511
	Toronto.....	Pound.....	0-06206	0-06775	0-056	0-04238	0-03606
	London.....	Long ton.....	21-060	23-246	18-007	12-958	11-913
Nickel.....	New York.....	Pound.....	0-36	0-35	0-36	0-36	0-35
Platinum.....	New York.....	Ounce.....	78-58	67-655	45-358	35-665	*10-104
Silver.....	New York.....	Ounce.....	0-58176	0-52993	0-38154	0-287	0-27892
Tin.....	New York.....	Pound.....	0-50472	0-45155	0-31694	0-24467	0-22017
	St. Louis.....	Pound.....	0-06027	0-06512	0-04556	0-0364	0-02876
Zinc.....	Montreal.....	Pound.....	0-07144	0-0687	0-05084	0-03961	0-03724
	London.....	Long ton.....	25-284	24-793	16-570	12-215	13-545

*All prices in dollars per unit excepting London lead and zinc prices which are quoted in £ sterling per long ton, and the 1922 price for platinum, which is quoted in £ sterling per fine ounce.

Table 5.—Annual Values of the Mineral Production of Canada, 1923-1932

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1923.....	214,079,331	23-41	1928.....	274,989,487	28-07
1924.....	209,583,406	22-71	1929.....	310,850,246	31-28
1925.....	226,583,333	24-19	1930.....	279,873,578	27-65
1926.....	240,437,123	25-61	1931.....	228,029,018	21-97
1927.....	247,356,695	25-99	1932.....	182,681,915	17-39

NOTE.—For years 1886 to 1922 see previous reports.

Table 6.—Annual Values of the Mineral Production of Canada by Classes, 1923-1932

Year	Metallics	Non-metallics including fuels	Clay products and other structural materials	Total
	\$	\$	\$	\$
Canada—				
1923.....	81,391,218	91,936,732	37,751,381	214,079,331
1924.....	102,406,528	71,796,009	35,380,869	209,583,406
1925.....	117,082,298	71,851,801	37,649,234	226,583,333
1926.....	115,237,581	85,240,144	39,959,398	240,437,123
1927.....	113,561,030	88,986,246	44,809,419	247,356,695
1928.....	132,012,454	93,239,852	49,737,181	274,989,487
1929.....	154,454,056	97,861,356	58,534,834	310,850,246
1930.....	142,743,764	83,402,349	53,727,465	279,873,578
1931.....	118,524,439	65,346,284	44,158,295	228,029,018
1932.....	103,495,453	56,788,179	22,398,283	182,681,915

NOTE.—For years 1907-1922 see previous reports.

Table 7.—Values of the Mineral Production of Canada, by Provinces, 1923-1932

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1923..	29,648,893	2,462,457	20,308,763	80,825,851	1,768,037	1,047,583	31,287,536	43,757,388	2,972,823
1924..	23,820,352	1,960,260	10,136,504	86,398,656	1,534,249	1,128,100	22,344,940	52,298,533	952,812
1925..	17,625,612	1,743,858	24,284,527	87,980,436	2,276,759	1,076,392	25,318,806	64,485,242	1,791,641
1926..	28,873,792	1,811,104	25,956,193	84,702,296	3,073,528	1,193,394	26,977,027	65,622,976	2,226,813
1927..	30,111,221	2,148,535	28,870,403	99,982,962	2,888,912	1,455,225	29,309,223	60,801,170	1,789,044
1928..	30,524,392	2,198,919	37,037,420	99,584,718	4,186,853	1,719,461	32,531,416	64,496,351	2,709,957
1929..	30,904,453	2,439,072	46,358,285	117,062,505	5,423,825	2,253,506	34,739,896	68,162,878	2,905,736
1930..	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182	2,368,612	30,427,742	54,953,320	2,521,588
1931..	21,080,746	2,176,910	35,996,563	96,113,235	9,965,854	1,931,880	23,580,727	35,337,756	2,145,347
1932..	16,198,573	2,223,505	24,512,470	79,509,239	8,714,459	1,681,697	21,183,079	26,767,522	1,891,371

NOTE.—For years 1899-1922 see previous reports.

Table 8.—Percentage of the Total Value of the Mineral Production of Canada, by Provinces, 1928-1932

Province	1928	1929	1930	1931	1932
Nova Scotia.....	11.10	9.94	9.65	9.24	8.9
New Brunswick.....	0.80	0.79	0.84	0.96	1.2
Quebec.....	13.47	14.93	14.73	15.65	13.4
Ontario.....	36.22	37.85	40.57	42.15	43.5
Manitoba.....	1.52	1.75	1.95	4.37	4.8
Saskatchewan.....	0.63	0.72	0.85	0.85	0.9
Alberta.....	11.83	11.17	10.87	10.34	11.6
British Columbia.....	23.45	21.92	19.64	15.50	14.7
Yukon.....	0.98	0.93	0.90	0.94	1.0
Canada.....	100.00	100.00	100.00	100.00	100.00

Table 9.—Mineral Production of Nova Scotia,* 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold..... fine oz.	1,272	26,295	460	9,509	964	19,923
Silver..... fine oz.	67	26	48	14	47	15
Manganese ore..... tons	4	60	60	2,400		
Non-METALLICS—						
Barytes..... tons	66	1,484	16	363		
Coal..... tons	6,252,552	24,528,860	4,955,563	19,016,720	4,084,581	15,167,793
Diatomite..... tons	398	7,960	1,484	29,679	1,438	28,760
Grindstones..... tons	6	110			12	433
Gypsum..... tons	827,063	982,287	707,817	878,487	341,508	398,861
Quartz..... tons	8,057	18,494	3,116	6,836		
Salt..... tons	23,058	136,226	27,718	143,761	31,897	150,708
Silica brick..... M	2,040	78,259	621	22,044		
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		495,333		467,126		172,557
Lime..... tons	31,114	113,250	18,430	79,418	6,533	35,534
Sand and gravel..... tons	525,683	310,407	403,858	198,757	423,487	136,677
Stone..... tons	152,463	320,316	83,181	225,632	34,661	87,307
Total.....		27,019,367		21,080,746		16,198,573

* In 1932, 30,697 long tons of pig iron were produced from Newfoundland ores, the output in 1931 was 101,393 long tons.

Table 10.—Mineral Production of New Brunswick, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Manganese ore..... tons	269	1,296	57	493		
Non-METALLICS—						
Coal..... tons	209,349	864,118	182,181	743,196	212,695	794,168
Grindstones..... tons	495	35,689	299	12,308	256	11,802
Gypsum..... tons	82,674	513,677	58,957	451,264	38,019	297,520
Manganese, bog..... tons	275	1,650	77	462		
Natural gas..... M cu.ft.	661,975	325,751	655,891	323,184	662,452	326,191
Petroleum..... tons	6,758	17,378	6,577	15,461	6,408	14,332
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		162,536		143,348		68,151
Lime..... tons	12,521	135,304	11,241	127,054	11,572	109,184
Sand and gravel..... tons	357,551	41,303	183,475	18,149	569,150	447,239
Stone..... tons	111,612	284,869	62,325	341,991	16,805	154,918
Total.....		2,383,571		2,176,916		2,223,505

Table 11.—Mineral Production of Quebec*, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Chromite..... tons					78	1,113
Copper..... lb.	80,310,363	10,425,891	68,376,985	5,723,154	67,336,692	4,296,216
Gold..... fine oz.	141,747	2,930,170	300,075	6,203,101	401,105	8,291,576
Silver..... fine oz.	571,164	217,922	530,345	158,414	628,902	199,184
Titanium ore, sold for export..... tons	412	1,239	1,509	10,261		
Zinc..... lb.	9,754,160	351,150				
NON-METALLICS—						
Asbestos..... tons	242,114	8,390,163	164,296	4,812,886	122,977	3,039,721
Feldspar..... tons	17,074	163,802	10,381	86,842	3,390	39,062
Graphite..... tons	197	9,850				
Iron oxides (ochre)..... tons	6,590	83,753	5,410	48,205	5,017	44,161
Magnesitic dolomite..... tons		336,162		295,579		262,860
Mica..... tons	430	61,729	290	30,601	41	4,076
Natural mineral waters..... imp. gal.	12,941	3,727	19,868	4,746	15,506	4,697
Peat..... tons	2,219	9,330	1,170	5,937	762	2,286
Phosphate..... tons	40	760			1,316	12,333
Quartz..... tons	49,561	119,668	26,987	69,759	20,123	71,645
Sulphur..... tons	12,653	93,038	14,586	108,617	17,954	133,838
Talc and soapstone..... tons		50,168		34,439		46,751
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	4,865,609	7,031,528	4,942,323	7,092,895	2,210,584	3,155,702
Clay products.....		2,464,044		2,360,908		1,064,551
Lime—						
Quicklime..... tons	117,358	874,077	101,186	720,049	76,983	493,787
Hydrated lime..... tons	11,992	93,573	10,310	84,169	16,830	94,114
Sand and gravel..... tons	6,581,807	1,750,690	7,657,964	1,952,959	3,458,128	893,896
Stone..... tons	3,818,126	5,752,786	4,265,929	5,893,042	2,246,825	2,360,901
Total.....		41,215,229		35,696,563		24,512,470

*There is also in this province an important production of aluminium from imported ores.

Table 12.—Mineral Production of *Ontario, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃)..... lb.	2,750,887	109,932	3,575,936	135,170	2,424,342	98,714
Bismuth..... lb.	12,732	6,366	7,331	3,532	16,798	7,289
Cobalt..... lb.	694,163	1,144,007	521,051	651,179	490,631	587,957
Copper..... lb.	127,718,871	15,187,259	112,882,625	9,096,463	77,055,413	4,407,928
Gold..... fine oz.	1,736,012	35,886,552	2,085,814	43,117,600	2,280,105	47,133,952
Lead..... lb.	2,193,856	116,034	985,633	41,647	86,477	1,828
Molybdenite..... lb.		1,222				
Nickel..... lb.	103,768,897	24,455,133	65,666,320	15,267,453	30,327,968	7,179,862
Palladium, Rhodium, etc..... fine oz.	34,040	894,511	46,310	1,217,717	37,613	901,890
Platinum..... fine oz.	34,000	1,542,172	44,725	1,595,117	27,284	1,097,021
Selenium..... lb.		16,899		32,108		
Silver..... fine oz.	10,205,683	3,893,876	7,438,951	2,222,014	6,335,788	2,006,648
Zinc..... lb.	3,527,894	127,004				
NON-METALLICS—						
Actinolite..... tons	34	437	35	456		
Diatomite..... tons	10	140	60	840	11	309
Feldspar..... tons	9,722	104,667	7,962	100,119	3,657	42,920
Fluorspar..... tons	80	1,240	40	620	32	464
Graphite..... tons	1,338	86,542	548	22,149	346	18,483
Gypsum..... tons	94,946	776,069	53,358	374,469	35,655	186,175
Mica..... tons	740	34,275	1,049	23,465	269	2,752
Natural mineral waters..... imp. gal.	214,200	20,754	197,540	8,578	61,208	2,473
Natural gas..... M cu.ft.	7,965,761	5,034,828	7,419,534	4,635,497	7,386,154	4,719,297
Peat..... tons	628	1,602	504	1,096	2,486	5,307
Petroleum..... brls.	117,302	235,746	122,365	219,993	130,343	247,468
Quartz..... tons	167,487	274,674	97,888	148,642	66,135	93,574
Salt..... tons	248,637	1,558,405	231,329	1,760,388	231,138	1,789,751
Silica brick..... M	378	19,120	279	13,702	93	4,304
Sulphur..... tons	7,277	73,855	6,508	65,080	3,332	33,320
Talc..... tons	11,664	133,213	11,806	122,044	12,064	111,585
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	3,942,690	5,779,404	3,470,056	5,006,826	1,599,342	2,288,975
Clay products.....		5,221,214		3,552,800		1,639,508
Lime—						
Quicklime..... tons	209,340	1,673,409	113,376	842,274	143,185	1,018,007
Hydrated..... tons	42,726	504,178	34,284	379,996	23,518	255,223
Sand and gravel..... tons	12,027,082	3,783,830	7,465,017	2,562,477	6,994,447	1,971,239
Stone..... tons	5,396,233	4,850,528	3,359,364	2,881,444	1,905,138	1,655,016
Total.....		113,530,976		96,113,235		79,509,239

*The total production of blast-furnace pig-iron in Ontario in 1930, was 534,542 long tons, in 1931 it was 318,645 long tons, and in 1932, 113,433 long tons.

†Sulphur content of pyrites shipped or estimated sulphur contained in the sulphuric acid made from smelter gases.

Table 13.—Mineral Production of Manitoba, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Copper..... lb.	2,087,609	215,018	45,821,432	3,835,254	52,706,861	3,362,803
Gold..... fine oz.	23,189	479,359	102,969	2,128,558	122,507	2,532,444
Selenium..... lb.			3,870	7,353		
Silver..... fine oz.	94,653	36,114	836,547	249,877	1,036,497	328,275
Zinc..... lb.	3,882,141	139,757	35,173,749	898,338	41,736,600	1,004,016
NON-METALLICS—						
Coal..... tons			1,306	3,797	1,552	3,684
Gypsum..... tons	34,157	298,297	23,076	231,124	12,719	113,739
Natural gas..... M cu.ft.	600	180	600	180	600	180
Quartz..... tons			67,214	76,624	87,253	102,493
Salt..... tons					508	7,092
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	977,906	2,268,742	544,160	1,267,893	242,112	549,594
Clay products.....		215,967		122,628		49,773
Lime..... tons	24,098	260,325	31,014	207,401	18,235	172,110
Sand and gravel..... tons	1,253,103	453,944	871,986	294,178	440,309	188,974
Stone..... tons	147,078	1,085,479	153,248	642,649	78,423	299,282
Total		5,453,182		9,965,854		8,714,459

Table 14.—Mineral Production of Saskatchewan, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Gold..... fine oz.					11	227
Silver..... fine oz.					14	4
NON-METALLICS—						
Coal..... tons	579,424	968,863	662,836	945,259	887,139	1,229,449
Sodium sulphate..... tons		293,847		421,097		271,736
Volcanic dust..... tons	242	4,840	128	2,560	180	3,600
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		349,283		166,257		109,739
Sand and gravel..... tons	3,680,553	751,779	1,388,594	396,707	362,841	66,942
Total		2,368,612		1,931,880		1,681,697

Table 15.—Mineral Production of Alberta, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Gold..... fine oz.			195	4,031	83	1,716
Silver..... fine oz.			29	9	9	3
NON-METALLICS—						
Bituminous sands..... tons	2,067	8,268	1,015	4,060	343	1,372
Coal..... tons	5,755,528	18,063,225	4,564,015	13,342,675	4,870,648	13,526,309
Natural gas..... M cu.ft.	20,748,583	4,929,226	17,798,698	4,067,893	15,370,968	3,853,794
Petroleum*..... brls.	1,398,160	4,780,696	1,413,631	3,976,220	907,661	2,760,792
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	525,289	1,144,160	626,483	1,286,080	193,571	399,922
Clay products.....		997,685		529,716		329,584
Lime..... tons	5,136	49,525	5,118	46,785	6,642	56,577
Sand and gravel..... tons	1,626,989	433,221	1,050,988	313,616	734,067	250,025
Stone..... tons	7,903	21,736	2,496	9,642	1,428	2,985
Total		30,427,742		23,580,727		21,183,079

*Includes a small production from Fort Norman well in Northwest Territories in 1932.

Table 16.—Mineral Production of British Columbia, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic As ₂ O ₃ lb.	1,773,333	19,595				
Bismuth..... lb.			110,876	154,118	57	51
Cadmium..... lb.		337,871		180,958		26,824
Copper..... lb.	93,318,885	12,114,657	65,223,348	5,459,194	50,580,104	3,227,111
Gold..... fine oz.	164,331	3,397,023	160,069	3,308,920	199,004	4,113,778
Lead..... lb.	321,803,725	12,637,232	261,902,236	7,097,812	252,007,574	5,326,432
Palladium, Rhodium, etc..... fine oz.	52	1,356				
Platinum..... fine oz.	24	1,089	50	1,783	59	2,372
Selenium..... lb.			731	1,389		
Silver..... fine oz.	11,825,930	4,512,065	8,061,599	2,408,000	7,293,462	2,309,958
Zinc..... lb.	250,479,310	9,017,255	202,071,702	5,160,911	130,546,958	3,140,438
NON-METALLICS—						
Coal..... tons	2,083,818	8,421,572	1,876,406	7,150,996	1,681,490	6,392,801
Diatomite..... tons	146	5,147	66	2,270	47	440
Grindstones, pulpstones..... tons	329	26,222	322	25,795	60	3,500
Gypsum..... tons	32,128	248,458	20,544	176,173	10,728	84,084
Iron oxides (ochre)..... tons	6	120	110	1,000	223	2,000
Quartz..... tons	1,095	5,291	519	1,297	15,621	8,435
Sodium carbonate..... tons	364	4,550	712	7,351	495	5,450
Sulphur*..... tons	17,800	147,942	29,013	255,760	31,886	302,856
Talc..... tons	177	2,835	30	600	39	702
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	721,044	1,489,233	578,636	1,172,549	253,112	536,528
Clay products.....		687,516		498,505		216,355
Lime—						
Quicklime..... tons	27,104	251,479	20,364	195,078	14,902	141,998
Hydrated..... tons	9,413	83,578	9,462	82,191	2,250	18,003
Sand and gravel..... tons	2,494,743	819,739	2,726,704	914,322	1,487,513	525,604
Slate..... tons	150	3,000	250	5,000	250	3,750
Stone..... tons	361,091	718,495	471,717	1,075,784	407,642	378,052
Total.....		54,953,320		35,337,756		26,767,522

*Sulphur content of pyrites shipped and estimated sulphur contained in the sulphuric acid made from smelter gases.

Table 17.—Mineral Production of the Yukon, 1930-1932

Product	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Copper..... lb.	42,628	5,534				
Gold..... fine oz.	35,517	734,202	44,310	915,969	40,608	839,442
Lead..... lb.	8,866,582	349,369	4,454,613	120,724	3,853,327	81,444
Silver*..... fine oz.	3,746,326	1,429,373	3,694,728	1,103,615	3,053,188	966,994
NON-METALLICS—						
Coal..... tons	653	3,110	904	5,039	808	3,491
Total.....		2,521,588		2,143,347		1,891,371

*Contains a relatively small quantity of silver produced in Northwest Territories in 1932.

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1928-1932

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
Metal Mining Industry							
ALLUVIAL GOLD MINES							
1928.....	82	82	10,384,575	342	538,270	57,178	852,735
1929.....	68	68	7,237,850	488	586,193	2,969	836,006
1930.....	79	79	5,881,620	394	612,369	8,272	877,778
1931.....	109	109	5,908,001	337	682,935	41,745	1,226,541
1932.....	120	120	7,306,130	373	665,711	38,840	1,211,018
AURIFEROUS QUARTZ MINES							
1928.....	98	100	147,693,710	9,066	14,615,990	2,554,657	36,655,330
1929.....	80	85	135,166,105	8,660	14,258,733	2,579,481	37,275,986
1930.....	54	56	119,758,057	8,401	14,034,620	2,364,102	39,771,739
1931.....	68	69	109,933,164	9,636	16,467,165	2,700,326	49,144,578
1932.....	100	100	58,167,335	10,442	17,686,584	3,031,494	58,645,772
COPPER-GOLD-SILVER MINES							
1928.....	164	174	50,004,340	4,777	6,764,309	731,836	15,281,519
1929.....	144	152	52,546,697	5,243	8,498,755	1,035,133	21,859,907
1930.....	61	68	45,844,395	5,694	9,156,759	1,272,262	15,629,564
1931.....	53	56	37,127,920	3,351	4,958,317	726,502	15,951,103
1932.....	28	30	14,793,372	3,076	3,770,627	463,463	11,143,759
SILVER-COBALT MINES							
1928.....	15	19	22,027,683	1,166	1,809,466	430,683	3,938,884
1929.....	27	32	15,820,435	1,149	1,532,333	407,952	3,918,316
1930.....	23	28	12,268,322	1,043	1,488,691	352,844	3,637,181
1931.....	22	26	9,352,520	786	1,149,689	227,467	1,925,593
1932.....	17	20	3,005,872	369	551,255	124,478	1,735,708
SILVER-LEAD-ZINC MINES							
1928.....	132	150	38,894,892	3,680	5,531,634	671,564	17,123,455
1929.....	149	168	50,573,661	4,153	6,482,392	793,139	22,748,089
1930.....	86	93	42,053,674	2,866	4,263,961	654,685	13,000,815
*1931.....	39	40	31,152,078	1,299	2,149,921	485,106	6,351,975
*1932.....	36	36	11,921,067	1,084	1,719,186	358,649	5,156,365
NICKEL-COPPER MINES							
1928.....	4	8	45,659,704	1,963	3,136,838	121,005	5,831,640
1929.....	2	5	19,448,290	3,219	5,105,875	184,363	7,967,640
1930.....	2	5	26,194,605	3,483	5,388,783	200,151	8,460,556
1931.....	3	6	21,320,977	2,133	3,150,240	105,403	7,539,836
1932.....	3	6	23,137,628	1,210	1,776,190	96,670	3,174,208
MISCELLANEOUS METAL MINES							
1928.....	5	5	627,000	62	61,886	8,880	6,732
1929.....	8	8	6,050	94	42,837	10,217	6,400
1930.....	10	10	427,906	116	110,096	5,100	2,595
1931.....	7	7	444,179	32	25,694	576	13,434
1932.....	5	5	1,140,200	34	35,181	2,475	1,113

*Contains data relating to silver ores in N.W.T.

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1928-1932—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries
			\$		\$	\$	\$
NON-FERROUS METAL SMELTING AND REFINING							
1928.....	8	10	120,035,742	7,526	12,228,738	5,180,770	*61,080,477
1929.....	7	10	146,699,085	8,119	13,772,393	6,208,733	*68,438,022
1930.....	10	13	175,010,686	8,626	13,796,124	6,465,897	*55,635,664
1931.....	11	14	175,669,195	7,860	13,245,327	6,053,398	*50,229,454
1932.....	10	13	149,708,860	5,343	8,778,970	4,435,394	*38,722,129
Total Metal Mining Industries							
1928.....	508	548	435,327,646	28,582	44,687,131	9,756,573	140,776,772
1929.....	485	528	427,498,173	31,125	50,279,511	11,221,987	163,059,366
1930.....	325	352	427,439,265	30,623	48,851,303	11,323,313	137,015,892
1931.....	312	327	390,908,034	25,434	41,823,288	10,340,523	132,382,514
1932.....	319	330	269,180,464	21,931	34,983,704	8,551,463	119,790,072
Non-Metal Mining Industries Including Fuels							
† FUELS							
COAL							
1928.....	380	427	146,835,825	30,256	43,320,811	3,679,721	60,462,687
1929.....	357	413	141,766,727	29,739	42,376,378	3,657,355	59,584,545
1930.....	390	430	140,316,395	29,172	36,442,361	3,595,416	49,905,327
1931.....	412	452	135,712,866	27,860	28,802,428	3,060,487	37,762,927
1932.....	455	493	131,879,671	26,960	25,042,769	3,066,601	34,984,922
NATURAL GAS							
1928.....	155	2,073	62,073,384	1,660	2,105,648	34,396	7,216,054
1929.....	145	2,298	68,592,709	1,953	2,275,147	41,590	8,555,971
1930.....	124	2,280	70,548,353	1,941	2,349,703	33,811	8,447,385
1931.....	145	2,444	71,085,678	1,692	2,072,022	26,921	8,232,822
1932.....	160	2,418	75,187,066	1,351	1,738,949	32,912	8,188,966
PETROLEUM							
1928.....	190	2,763	31,182,352	1,118	1,916,625	205,183	2,807,528
1929.....	231	2,635	54,526,398	2,221	3,748,689	293,354	4,368,374
1930.....	234	2,324	63,300,244	1,869	3,337,754	363,998	6,481,847
1931.....	160	2,346	57,620,950	1,209	1,634,517	303,511	4,733,287
1932.....	175	2,210	48,568,562	655	776,163	120,842	3,467,538
TOTAL FUELS							
1928.....	785	5,263	240,091,561	33,034	47,343,084	3,919,300	70,486,269
1929.....	733	5,346	264,885,834	33,913	48,400,214	3,992,299	72,508,890
1930.....	748	5,034	274,164,992	32,982	42,129,818	3,993,225	64,834,559
1931.....	717	5,242	264,419,494	30,761	32,508,967	3,390,919	50,729,036
1932.....	790	5,121	255,635,299	28,966	27,557,881	3,220,355	46,641,426

*Value added by smelting. †Production of peat for 1928-1932 included in the miscellaneous non-metallics.

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1928-1932—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
OTHER NON-METAL MINING INDUSTRIES							
ABRASIVES—NATURAL							
1928.....	9	9	448,618	163	96,558	12,998	119,715
1929.....	9	9	790,791	154	152,805	18,942	122,684
1930.....	10	10	345,102	45	42,867	4,305	80,108
1931.....	8	8	569,772	31	25,837	3,906	73,452
1932.....	10	10	679,865	36	26,471	2,422	48,844
ASBESTOS							
1928.....	7	14	35,705,212	3,170	3,989,644	1,177,715	11,238,360
1929.....	7	8	33,248,957	3,391	4,410,535	1,335,610	13,172,581
1930.....	7	8	35,097,872	2,770	3,474,215	1,133,737	8,390,163
1931.....	7	8	40,164,005	1,675	1,836,115	849,047	4,812,886
1932.....	7	8	30,081,362	1,409	1,156,315	827,303	3,039,721
FELDSPAR AND QUARTZ							
1928.....	37	39	1,396,485	481	367,332	48,846	808,875
1929.....	38	40	1,223,675	488	353,891	41,462	901,993
1930.....	51	52	870,488	429	257,388	35,645	686,596
1931.....	33	36	1,342,668	166	135,809	20,996	490,119
1932.....	33	33	936,177	120	91,603	13,391	358,129
GYPSUM							
1928.....	16	22	8,035,319	1,159	1,171,814	242,260	3,743,648
1929.....	17	22	7,438,605	987	1,054,213	281,019	3,345,696
1930.....	16	18	8,796,865	822	781,639	201,409	2,818,788
1931.....	17	19	7,941,082	676	656,590	188,524	2,111,517
1932.....	15	17	8,054,148	478	368,484	122,926	1,080,379
IRON OXIDES (OCHRE)							
1928.....	5	5	154,251	45	38,834	18,666	111,198
1929.....	4	4	159,523	48	47,324	13,564	115,932
1930.....	4	4	150,704	43	41,238	13,929	83,873
1931.....	4	4	181,535	30	29,194	8,560	49,205
1932.....	4	4	206,863	26	22,909	5,993	46,161
MICA							
1928.....	16	16	260,074	94	42,159	1,966	87,168
1929.....	14	14	281,295	83	47,362	355	118,549
1930.....	13	13	441,744	244	63,316	1,102	96,004
1931.....	11	11	276,356	28	22,556	444	54,066
1932.....	5	5	119,670	9	7,864	50	6,828
SALT							
1928.....	9	10	4,422,922	455	539,775	252,468	1,495,971
1929.....	8	8	4,576,543	421	516,453	249,664	1,578,085
1930.....	8	8	4,685,549	381	455,539	197,313	1,694,631
1931.....	7	7	4,196,927	363	446,984	184,001	1,904,149
1932.....	7	8	3,805,008	345	455,049	176,836	1,947,551

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1928-1932—Continued

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
<i>OTHER NON-METAL MINING INDUSTRIES—Concluded</i>							
TALC AND SOAPSTONE							
1928.....	5	5	732,608	91	85,161	21,850	219,358
1929.....	5	5	654,635	86	74,300	21,395	229,198
1930.....	6	6	614,384	141	79,472	16,369	186,216
1931.....	5	5	618,590	70	71,787	19,128	157,083
1932.....	5	5	703,532	83	76,577	17,930	159,038
MISCELLANEOUS							
1928.....	33	33	4,478,481	394	414,650	128,029	1,002,399
1929.....	35	38	4,042,638	506	545,216	79,463	1,502,574
1930.....	38	38	3,608,896	498	527,183	188,449	1,192,417
1931.....	34	34	5,457,930	275	297,394	205,149	1,247,697
1932.....	35	35	2,072,913	182	155,166	110,396	1,061,779
<i>TOTAL OTHER NON-METAL MINING INDUSTRIES</i>							
1928.....	137	153	55,633,970	6,052	6,745,927	1,904,798	18,826,692
1929.....	140	148	52,416,662	6,167	7,202,099	2,041,474	21,087,298
1930.....	153	157	54,611,604	5,373	5,722,857	1,792,258	15,228,796
1931.....	126	132	60,748,865	3,314	3,522,266	1,479,755	10,900,174
1932.....	121	125	46,659,538	2,688	2,360,438	1,277,247	7,748,430
<i>Total Non-Metal Mining Industries, Including Fuels</i>							
1928.....	862	5,416	295,725,531	39,086	54,089,011	5,824,098	89,312,961
1929.....	873	5,494	317,302,496	40,080	55,602,313	6,033,773	93,596,188
1930.....	901	5,191	323,776,596	38,355	47,852,675	5,785,483	89,063,355
1931.....	843	5,374	325,168,359	31,075	36,031,233	4,870,674	61,623,210
1932.....	911	5,246	302,294,837	31,654	29,918,319	4,497,692	54,389,856
<i>Clay Products and Other Structural Materials</i>							
CLAY PRODUCTS Brick, Tile and Sewer Pipe							
1928.....	170	179	32,071,948	5,024	4,999,575	2,278,421	12,013,006
1929.....	181	191	33,493,902	8,366	5,541,452	2,902,869	13,568,646
1930.....	186	198	32,757,926	4,870	4,807,380	1,910,899	10,296,960
1931.....	171	185	33,159,664	3,131	3,428,142	1,476,870	7,585,310
1932.....	143	159	24,910,020	1,622	1,469,270	569,515	3,405,295
STONEWARE AND POTTERY							
1928.....	4	4	401,255	161	175,087	15,929	359,562
1929.....	4	4	696,154	155	177,620	17,515	326,408
1930.....	5	5	672,851	156	153,750	11,707	296,618
1931.....	4	4	659,500	128	113,108	9,568	255,978
1932.....	5	5	437,562	118	107,316	10,288	244,923
<i>TOTAL CLAY PRODUCTS*</i>							
1928.....	177	186	32,473,203	5,195	5,181,398	2,294,350	12,381,718
1929.....	186	196	34,190,056	5,530	5,727,014	2,920,384	13,904,643
1930.....	191	203	33,430,777	5,026	4,961,130	1,922,606	10,593,578
1931.....	175	189	33,819,164	3,259	3,541,260	1,486,438	7,841,288
1932.....	148	164	25,347,582	1,740	1,576,586	579,803	3,650,218

*Includes kaolin and other clays.

Table 18.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1928-1932—Concluded

Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
<i>OTHER STRUCTURAL MATERIALS</i>							
<i>CEMENT</i>							
1928.....	5	11	47,678,841	2,407	3,405,385	3,872,108	16,739,163
1929.....	8	11	50,881,818	2,546	3,523,595	4,347,219	19,337,235
1930.....	8	11	59,210,737	2,317	3,172,198	4,120,367	17,713,067
1931.....	9	12	57,378,436	1,820	2,432,950	3,280,870	15,826,243
1932.....	6	12	55,294,814	1,216	1,344,772	1,701,125	6,930,721
<i>LIME</i>							
1928.....	46	54	6,952,079	1,218	1,316,115	912,395	4,534,568
1929.....	46	53	7,404,677	1,382	1,393,092	1,183,313	5,908,610
1930.....	44	50	8,816,879	1,086	1,087,778	886,354	4,038,698
1931.....	54	60	7,289,990	799	785,868	612,278	2,764,415
1932.....	53	60	6,823,949	677	575,072	535,433	2,394,537
<i>SANDS AND GRAVEL</i>							
1928.....	493	2,553	7,783,135	7,831	2,468,468	193,391	5,809,431
1929.....	541	2,598	9,154,055	8,758	2,505,225	285,491	7,317,814
1930.....	724	2,993	7,550,217	5,601	2,508,037	331,010	8,344,913
1931.....	704	3,287	8,635,241	3,224	2,878,011	292,892	6,651,165
1932.....	688	4,249	9,542,446	1,743	1,322,201	190,477	4,480,596
<i>STONE</i>							
1928.....	254	268	16,027,547	5,129	4,806,514	579,086	10,272,301
1929.....	247	268	20,589,758	5,681	5,459,761	759,418	12,066,532
1930.....	285	305	22,196,388	6,192	5,542,211	697,060	13,037,209
1931.....	300	329	18,860,796	4,198	4,470,699	625,673	11,075,184
1932.....	296	319	16,727,481	2,509	2,051,395	420,581	4,942,211
<i>TOTAL OTHER STRUCTURAL MATERIALS</i>							
1928.....	798	2,886	78,441,602	16,585	11,996,482	5,556,980	37,355,463
1929.....	842	2,980	88,030,308	18,567	12,881,673	6,575,441	44,630,191
1930.....	1,061	3,359	97,774,221	15,196	12,910,224	6,034,791	43,133,887
1931.....	1,067	3,688	92,164,463	10,041	10,567,528	4,811,713	36,317,007
1932.....	1,043	4,640	88,388,690	6,145	5,893,440	2,847,616	18,748,065
<i>Total Clay Products and Other Structural Materials</i>							
1928.....	975	3,072	110,914,805	21,780	17,177,880	7,851,330	49,737,181
1929.....	1,028	3,126	122,229,364	23,897	18,698,687	9,495,825	58,534,834
1930.....	1,252	3,562	131,204,998	20,222	17,271,354	7,957,397	53,727,465
1931.....	1,242	3,877	125,983,627	13,300	14,108,778	6,298,151	44,158,295
1932.....	1,191	4,804	113,736,272	7,885	6,870,626	3,427,419	22,398,283
<i>GRAND TOTAL OF ALL INDUSTRIES</i>							
1928.....	2,345	9,036	841,967,982	89,448	115,954,022	23,432,001	279,820,914
1929.....	2,586	9,148	867,021,033	95,102	124,490,511	26,751,585	315,181,388
1930.....	2,478	9,105	887,420,859	89,200	113,975,332	25,066,193	270,806,712
1931.....	2,397	9,578	842,060,020	72,809	91,969,299	21,509,348	238,170,619
1932.....	2,421	10,380	685,211,573	61,470	71,772,049	16,476,484	196,578,211

MINERAL PRODUCTION OF CANADA

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Table 19.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1928-1932

Year	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries \$
NOVA SCOTIA*						
1928	104	67,329,525	15,497	21,249,053	2,391,558	28,410,600
1929	98	67,356,948	14,738	21,035,230	2,436,137	28,529,875
1930	125	65,363,756	15,484	19,284,197	2,410,115	25,043,071
1931	244	63,853,580	14,871	15,302,444	2,020,666	19,258,296
1932	495	63,415,735	13,706	11,302,801	2,047,874	15,049,226
NEW BRUNSWICK						
1928	97	3,331,338	1,244	1,107,462	147,154	2,153,943
1929	93	4,945,074	1,361	1,236,726	168,830	2,407,456
1930	113	5,349,073	1,391	1,132,306	162,591	2,350,372
1931	116	5,543,570	1,197	1,048,860	163,893	2,137,832
1932	563	4,998,656	1,480	1,123,080	96,922	2,185,174
QUEBEC						
1928	2,418	133,350,529	17,934	15,921,744	5,953,108	48,631,311
1929	2,426	146,332,805	19,678	16,886,275	6,703,881	57,313,685
1930	2,416	140,286,034	15,397	15,190,714	5,885,600	51,673,630
1931	2,723	146,067,130	11,141	12,666,586	5,607,812	44,064,907
1932	2,487	121,200,895	7,694	8,198,379	4,243,362	32,834,588
ONTARIO						
1928	5,390	325,844,956	23,508	31,912,123	8,343,144	99,003,578
1929	5,417	302,937,672	24,924	34,897,624	9,766,197	116,174,844
1930	5,267	326,396,783	24,706	34,433,915	9,022,652	105,434,625
1931	5,409	305,883,585	20,277	30,470,475	7,508,844	98,509,571
1932	5,196	244,250,088	16,376	24,412,126	5,447,055	85,868,259
MANITOBA						
1928	41	15,755,174	1,625	1,926,264	631,430	4,183,342
1929	51	18,020,285	1,819	2,375,990	992,386	5,423,628
1930	135	35,812,839	3,021	4,372,044	1,205,288	5,665,008
1931	107	39,113,921	2,059	3,096,332	796,076	15,122,432
1932	133	21,349,000	1,730	2,106,017	479,993	11,396,818
SASKATCHEWAN						
1928	124	5,647,417	1,229	942,150	140,577	1,686,136
1929	126	6,097,476	1,421	1,139,373	173,677	2,211,708
1930	144	6,424,080	1,371	1,040,790	229,760	2,333,280
1931	111	7,136,859	1,092	896,131	222,526	1,876,284
1932	115	6,013,271	924	748,782	152,433	1,626,307
ALBERTA						
1928	490	118,556,978	12,358	18,022,037	1,386,358	31,569,442
1929	558	142,942,397	13,824	19,915,537	1,476,468	33,883,239
1930	562	149,974,382	12,675	16,272,916	1,407,136	29,933,896
1931	553	141,629,189	10,579	11,357,722	1,198,890	23,021,495
1932	567	124,484,906	9,692	10,476,449	804,137	20,701,075
BRITISH COLUMBIA						
1928	319	159,445,533	15,720	24,064,962	4,312,507	61,847,246
1929	355	170,575,223	16,882	26,073,143	4,943,945	66,256,597
1930	319	150,279,895	14,836	21,412,925	4,652,217	45,768,150
1931	309	127,009,722	11,297	16,345,887	3,874,529	31,925,780
1932	819	91,469,101	9,582	12,642,830	3,094,145	25,071,738
YUKON						
1928	53	12,706,532	333	808,227	126,165	2,335,316
1929	24	7,813,153	455	930,613	90,064	2,980,356
1930	24	7,534,017	319	835,525	90,834	2,583,481
(a) 1931	6	5,822,464	296	784,862	116,112	2,253,422
(a) 1932	5	8,029,918	286	761,585	110,563	1,845,026
CANADA						
1928	9,036	841,967,982	89,448	115,954,022	23,432,001	279,820,914
1929	9,148	867,021,033	95,102	124,490,511	26,751,585	315,181,388
1930	9,105	887,420,859	89,200	113,975,332	25,066,193	270,785,513
1931	9,578	842,060,020	72,809	91,969,239	21,509,348	238,170,019
1932	10,350	685,211,573	61,470	71,772,049	16,476,484	196,578,211

* Includes a small production from Prince Edward Island during 1928.

(a) Contains data for N.W.T.

Note.—The increases in column 1 in 1932 for Nova Scotia, New Brunswick and British Columbia were mainly accounted for by more detailed information received from the Provincial Highways Departments on the number of gravel pits in use during the year.

Table 20.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1931 and 1932

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1931					\$	\$	\$
Nova Scotia.....	493	73	14,305	14,871	1,122,790	14,179,654	15,362,444
New Brunswick.....	65	17	1,115	1,197	161,660	887,200	1,048,860
Quebec.....	815	96	10,230	11,141	1,830,797	10,835,789	12,666,586
Ontario.....	1,580	223	18,474	20,277	4,324,136	26,146,339	30,470,475
Manitoba.....	166	16	1,877	2,059	510,118	2,586,214	3,096,332
Saskatchewan.....	71	12	1,009	1,052	162,181	733,950	896,131
Alberta.....	777	95	9,707	10,578	1,892,734	9,464,988	11,357,722
British Columbia.....	920	102	10,275	11,297	2,357,133	13,988,754	16,345,887
Yukon.....	23	1	272	266	86,489	698,373	784,862
Canada.....	4,910	635	67,264	72,809	12,448,038	79,521,261	91,969,299
1932							
Nova Scotia.....	440	52	13,214	13,706	885,128	10,417,673	11,302,801
New Brunswick.....	66	16	1,398	1,489	135,850	987,230	1,123,080
Quebec.....	651	75	6,968	7,694	1,396,131	6,802,248	8,198,379
Ontario.....	1,449	200	14,727	16,376	3,878,765	20,533,361	24,412,126
Manitoba.....	114	3	1,613	1,739	261,349	1,844,668	2,106,017
Saskatchewan.....	69	8	847	924	149,054	599,728	748,782
Alberta.....	770	83	8,839	9,632	1,750,314	8,726,135	10,476,449
British Columbia.....	839	72	8,654	9,595	1,980,107	10,632,044	12,612,151
Yukon.....	21	2	280	303	65,473	726,791	792,264
Canada.....	4,419	511	56,540	61,470	10,592,171	61,269,878	71,772,049

The average number of wage-earners was obtained by adding the monthly figures for individual companies and dividing by 12 irrespective of the number of months worked, the average number of wage-earners in the industry, as in the previous year, is the sum of these individual averages.

Table 21.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1931-1932

Industry and year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1931					\$	\$	\$
METAL MINING							
Alluvial Gold Mines.....	25	2	310	337	78,285	604,650	682,935
Auriferous Quartz Mines.....	524	29	9,083	9,636	1,711,496	14,755,669	16,467,165
Copper-Gold-Silver Mines.....	211	15	3,125	3,351	561,223	4,397,094	4,958,317
Silver-Cobalt Mines.....	52	2	732	786	147,195	1,002,494	1,149,689
Silver-Lead-Zinc Mines.....	146	11	1,142	1,299	377,740	1,772,181	2,149,921
Nickel-Copper Mines.....	41	.....	2,092	2,133	170,155	2,980,085	3,150,240
Miscellaneous Metal Mines.....	3	.....	29	32	5,954	19,740	25,694
Non-ferrous Smelting and Refining.....	775	103	6,982	7,860	2,131,079	11,114,248	13,245,327
NON-METAL MINING, INCLUDING FUELS							
Fuels							
Coal.....	1,242	129	26,489	27,860	2,960,546	25,841,882	28,802,428
Natural Gas.....	460	136	1,096	1,692	915,409	1,156,613	2,072,022
Petroleum.....	138	28	1,043	1,209	368,320	1,266,197	1,634,517
Other Non-Metal Mining							
Abrasives—natural.....	6	3	22	31	11,856	13,981	25,837
Asbestos.....	138	34	1,503	1,675	405,060	1,431,055	1,836,115
Feldspar and Quartz.....	23	2	141	166	31,462	104,347	135,809
Gypsum.....	52	12	612	676	131,887	524,703	656,590
Iron oxides.....	2	.....	28	30	3,800	25,394	29,194
Mica.....	2	1	25	28	5,770	16,786	22,556
Salt.....	41	16	306	363	112,479	334,505	446,984
Talc and Soapstone.....	5	2	63	70	23,275	48,512	71,787
Miscellaneous.....	37	4	234	275	68,947	228,447	297,394

*See foot note above.

Table 21.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1931-1932—Concluded

Industry and year	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1931					\$	\$	\$
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	110	11	1,699	1,829	268,434	2,164,516	2,432,950
Clay Products.....	390	45	2,824	3,259	918,781	2,622,469	3,541,250
Lime.....	67	11	721	799	121,525	664,343	785,868
Sand and Gravel.....	118	12	3,094	3,224	257,481	2,620,530	2,878,011
Stone.....	302	27	3,869	4,198	659,879	3,810,820	4,470,699
Total.....	4,910	635	67,264	72,809	12,448,038	79,521,261	91,969,299
1932							
METAL MINING							
Alluvial Gold Mines.....	25	1	347	373	51,420	614,291	665,711
Auriferous Quartz Mines.....	598	35	9,809	10,442	1,883,445	15,803,139	17,686,584
Copper-Gold-Silver Mines.....	139	4	2,933	3,076	350,866	3,419,761	3,770,627
Silver-Cobalt Mines.....	33	1	335	369	107,850	443,405	551,255
Silver-Lead-Zinc Mines.....	105	10	969	1,084	266,343	1,452,843	1,719,186
Nickel-Copper Mines.....	43	.....	1,167	1,210	153,109	1,623,081	1,776,190
Miscellaneous Metal Mines.....	5	.....	29	34	8,335	26,846	35,181
Non Ferrous Smelting and Refining.....	675	64	4,604	5,343	1,690,710	7,088,260	8,778,970
NON-METAL MINING INCLUDING FUELS							
Fuels							
Coal.....	1,254	109	25,597	26,960	2,779,328	22,263,441	25,042,769
Natural Gas.....	443	128	780	1,351	844,193	894,756	1,738,949
Petroleum.....	104	17	534	655	216,871	559,292	776,163
Other Non-Metal Mining							
Abrasives—natural.....	7	2	27	36	11,671	14,800	26,471
Asbestos.....	110	26	1,273	1,409	279,950	876,365	1,156,315
Feldspar and Quartz.....	18	2	100	120	32,462	59,141	91,603
Gypsum.....	40	6	432	478	90,418	278,066	368,484
Iron Oxides.....	1	.....	25	26	3,240	19,669	22,909
Mica.....	1	.....	8	9	1,750	6,114	7,864
Salt.....	46	16	283	345	133,449	321,600	455,049
Talc and Soapstone.....	6	2	75	83	20,422	56,155	76,577
Miscellaneous.....	29	6	147	182	54,822	100,344	155,166
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	96	7	1,113	1,216	213,891	1,130,881	1,344,772
Clay Products.....	265	39	1,436	1,740	565,675	1,010,911	1,576,586
Lime.....	63	7	607	677	106,150	468,922	575,072
Sand and Gravel.....	87	5	1,651	1,743	165,218	1,156,983	1,322,201
Stone.....	226	24	2,259	2,509	470,583	1,580,812	2,051,395
Total.....	4,419	511	56,540	61,470	10,502,171	61,269,878	71,772,049

* See footnote to table 20.

Table 22.—Number of Wage-Earners in Canadian Mining Industries, in Month of Highest Employment During 1931, whose Regular (Normal) Hours, per Week, were:

(Does not include overtime)

	40 hours or less	41-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-53 hours	54 hours	55 hours	56-59 hours	60 hours	Over 60 hours
By Provinces—												
Nova Scotia.....	571		12	4	14,409		362	479	29	185	1,189	20
New Brunswick.....	44		3	16	227	51	48	746		22	95	71
Quebec.....	257	1,050	506	220	1,973	362	209	1,116	1,103	599	6,833	983
Ontario.....	403	40	208	105	10,202	408	346	2,945	331	4,064	1,990	1,207
Manitoba.....	28	3	76	4	73	3	101	57	239	1,469	217	235
Saskatchewan.....	17			11	333	28		351	2	93	967	57
Alberta.....	615	5	47	187	10,336	54	20	103	26	1,525	469	40
British Columbia.....	1,176	6	127	16	7,752	25	48	30	143	2,745	60	38
†Yukon.....					12					160		239
Canada.....	3,111	1,104	979	563	45,317	931	1,134	5,827	1,873	10,862	11,820	2,890
By Industries—												
METAL MINING—												
Alluvial Gold Mines.....	21				135			14	2	132	30	266
Auriferous Quartz Mines.....	7			1	6,639	20	324	1,028		1,504	47	486
Copper-Gold-Silver Mines.....	2		6		1,687	23	40		441	1,293	124	104
Silver-Cobalt Mines.....					796		89	51		22		11
Silver-Lead-Zinc Mines.....	903		1		237		7			253	5	15
Nickel-Copper Mines.....					1,933			375		123	15	5
Miscellaneous Metal Mines.....					54			18				
Non-Ferrous Smelting and Refining.....	77	172	233	11	2,032	150	19	587	77	4,036	172	304
NON-METAL MINING INCLUDING FUELS—												
Fuels—												
Coal.....	1,016	2	46	55	29,024	44	362	908	4	100	379	29
Natural Gas.....	70			107	159		45	637		14	86	27
Petroleum.....	30	2			184	17		4	21	1,336	29	10
Other Non-metal Mining—												
Abrasives—natural.....	4					1		4			35	
Asbestos.....		763									1,383	10
Feldspar and Quartz.....		1	2		21	12	7	128	7	9	114	5
Gypsum.....	127	4	14	32	25	6	8	257	3	148	342	142
Iron Oxides.....							31				17	
Mica.....						8		18	19			
Salt.....	5		30	4	112	4	1	1	1	12	100	99
Talc and Soapstone.....							5				66	3
Miscellaneous.....	4		3		47			38	34	15	160	168
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—												
Cement.....		7	50	72	586	3	25	206	39	630	263	235
Clay Products.....	360	20	243	75	453	353	32	439	730	218	1,009	484
Line.....	61	29	78	20	299	1	2	72	33	70	355	76
Sand and Gravel.....	41	19	26	10	164	31	48	31	35	563	5,009	63
Stone.....	383	85	247	176	730	258	89	1,011	437	384	2,080	348
Total.....	3,111	1,104	979	563	45,317	931	1,134	5,827	1,873	10,862	11,820	2,890

†Contains data for N.W.T.

Table 23.—Number of Wage-Earners in Canadian Mining Industries, in Month of Highest Employment During 1932, whose Regular (Normal) Hours, per Week, were:

(Does not include overtime)

	40 hours or less	41-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-53 hours	54 hours	55 hours	56-59 hours	60 hours	Over 60 hours
By Provinces—												
Nova Scotia.....	501	51	9	7	10,402	5	264	492	60	87	395	39
New Brunswick.....	67	.....	12	11	312	46	45	804	2	18	945	77
Quebec.....	250	500	426	180	2,946	213	104	1,703	373	613	4,003	191
Ontario.....	495	112	789	86	9,906	207	160	1,728	185	3,010	1,591	645
Manitoba.....	38	7	105	26	380	10	91	127	39	868	119	207
Saskatchewan.....	70	4	30	6	709	30	2	189	16	3	431	97
Alberta.....	785	9	141	368	9,768	39	67	163	19	573	211	35
British Columbia.....	1,278	2	169	20	5,848	1	146	8	.....	3,089	11	33
†Yukon.....	.....	.....	.....	.....	3	.....	.....	.....	.....	162	255	16
Canada.....	3,484	685	1,681	704	40,274	551	879	5,214	694	8,423	7,961	1,345
By Industries—												
METAL MINING—												
Alluvial Gold Mines.....	.....	.....	3	.....	208	.....	.....	4	.....	265	261	33
Auriferous Quartz Mines.....	.....	.....	370	8	7,618	22	280	942	14	1,718	44	279
Copper-Gold-Silver Mines.....	.....	.....	.....	.....	1,950	.....	.....	249	.....	1,153	8	137
Silver-Cobalt Mines.....	.....	.....	.....	.....	391	.....	.....	87	.....	6	.....	6
†Silver-Lead-Zinc Mines.....	766	.....	.....	.....	101	.....	.....	.....	.....	236	20	16
Nickel Copper Mines.....	.....	.....	.....	.....	1,414	.....	.....	253	.....	3	72	2
Miscellaneous Metal Mines.....	.....	.....	.....	.....	37	.....	.....	.....	.....	20	5	.....
Non-Ferrous Smelting and Refining.....	62	36	267	14	1,490	.....	.....	378	.....	3,564	161	44
NON-METAL MINING INCLUDING FUELS—												
Fuels—												
Coal.....	1,430	10	85	37	24,446	42	326	946	16	80	524	129
Natural Gas.....	184	.....	2	332	135	2	75	212	2	27	58	38
Petroleum.....	54	2	.....	.....	148	10	5	21	19	441	29	5
Other Non-metal Mining—												
Abrasives—natural.....	10	.....	.....	.....	20	.....	.....	.....	.....	.....	39	.....
Asbestos.....	.....	441	.....	.....	.....	.....	.....	199	.....	.....	1,132	3
Feldspar and Quartz.....	.....	.....	.....	24	13	.....	6	96	4	.....	127	.....
Gypsum.....	109	18	34	15	9	36	3	361	65	.....	75	82
Iron Oxides.....	7	.....	13	.....	.....	.....	7	.....	.....	.....	12	4
Mica.....	.....	.....	.....	.....	.....	2	.....	.....	5	.....	5	.....
Salt.....	12	2	5	2	23	2	12	27	2	27	169	54
Talc and Soapstone.....	.....	.....	3	.....	.....	.....	.....	.....	19	.....	64	3
Miscellaneous.....	3	2	.....	.....	23	.....	2	.....	45	16	184	14
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—												
Cement.....	181	9	233	25	528	2	7	36	4	211	131	96
Clay Products.....	277	65	247	116	359	124	49	416	297	225	446	141
Lime.....	70	21	66	3	224	.....	.....	196	20	41	223	66
Sand and Gravel.....	63	70	75	6	329	33	16	120	.....	23	2,717	43
Stone.....	256	9	278	122	808	276	91	671	182	367	1,455	148
Total.....	3,484	685	1,681	704	40,274	551	879	5,214	694	8,423	7,961	1,345

†Contains data on mining of silver-pitchblende ores in N.W.T.

Table 24.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthracite coal	Lignite coal		Coke
	Canadian	Imported		Canadian	Imported	
	Tons	Tons	Tons	Tons	Tons	
METAL MINING						
Alluvial Gold Mines.....	Quantity 90	1				
	\$ 811	260				
Auriferous Quartz Mines.....	Quantity 382	20,261	250			119
	\$ 5,463	179,470	4,518			1,796
Copper-Gold-Silver Mines.....	Quantity 3,789	644	47	18		49
	\$ 33,263	4,840	845	160		547
Silver-Cobalt Mines.....	Quantity	3,100	154			
	\$	34,328	2,438			
Silver-Lead-Zinc Mines.....	Quantity 25,294	345				64
	\$ 118,369	2,242				640
Nickel-Copper Mines.....	Quantity	2,071	70			10
	\$	12,558	1,175			115
Miscellaneous Metal Mines.....	Quantity					
	\$					
†Non-Ferrous Smelting and Refining.....	Quantity 89,898	191,684	59	33		*5,105
	\$ 489,927	1,009,717	998	211		48,533
Total.....	Quantity 119,453	218,106	580	51		5,347
	\$ 647,833	1,243,415	9,974	371		51,631
NON-METAL MINING, INCLUDING FUELS						
<i>Fuels</i>						
Coal.....	Quantity 647,461			115,750		
	\$ 2,076,349			109,741		
Natural Gas.....	Quantity 13	189	3			
	\$ 122	1,602	50			
Petroleum.....	Quantity 4,902					
	\$ 21,749					
Total.....	Quantity 652,376	189	3	115,750		
	\$ 2,098,220	1,602	50	109,741		
<i>Other Non-Metal Mining</i>						
Abrasives—natural.....	Quantity 287			54		10
	\$ 2,101			271		140
Asbestos.....	Quantity 23,644	337	5,477	1,412		583
	\$ 152,012	2,341	39,638	9,672		5,385
Feldspar and Quartz.....	Quantity 338	706	4			
	\$ 2,271	4,282	68			
Gypsum.....	Quantity 8,874	2,507		450		347
	\$ 50,522	20,524		4,060		3,812
Iron Oxides.....	Quantity 81		16			
	\$ 587		256			
Mica.....	Quantity	46				
	\$	301				
Salt.....	Quantity 2,210	41,160				
	\$ 10,668	163,430				
Talc and Soapstone.....	Quantity		20			
	\$		250			
Miscellaneous.....	Quantity 5,614	931	2	10,445		
	\$ 32,807	4,512	31	34,152		
Total.....	Quantity 41,048	45,687	5,519	12,361		940
	\$ 250,968	195,390	40,243	48,155		9,337
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement.....	Quantity 288,851	194,067	1,096			63
	\$ 1,569,214	958,076	4,000			589
Clay Products.....	Quantity 31,045	131,888	2,400	2,505	47	1,549
	\$ 198,383	815,923	20,335	10,486	300	12,713
Lime.....	Quantity 3,799	46,545	456			7,640
	\$ 24,121	267,376	2,209			50,343
Sand and Gravel.....	Quantity 1,347	23,591	42			6
	\$ 10,786	133,836	546			57
Stone.....	Quantity 5,323	10,780	637	94		39
	\$ 37,152	72,822	3,927	518		414
Total.....	Quantity 330,365	406,871	4,631	2,599	47	9,297
	\$ 1,839,656	2,248,033	31,017	11,004	300	64,116
Canada.....	Quantity 1,143,242	670,853	10,733	130,761	47	15,584
	\$ 4,836,677	3,688,440	81,284	169,271	300	125,084

*Coke used for fuel only. Coke used in smelting amounted to 176,356 tons valued at \$1,565,927.

†Coal used for furnace charges totalled 132,133 tons valued at \$1,068,923.

Industry in Canada, by Kinds and by Industries, 1931

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.	\$	K.W.H.
11,416	1,244	980	3,861						11,387,391
5,684	383	148	34,459					41,745	
46,781	6,981	2,019,405	14,501				253,436,606		10,299,099
14,067	1,859	208,575	61,428			280	2,222,870	2,700,326	
36,099	1,688	485,107	2,209				225,400,728		33,720,342
7,793	533	25,480	8,049			853	644,139	726,502	
3,844	220	29,509	789				12,637,458		
1,066	50	4,500	4,476			25,384	155,225	227,467	
2,627	331	265,275	526				37,445,935		15,844,853
1,128	225	93,829	12,125				256,548	485,106	
811	1,875	41,817					48,757,862		
210	416	4,472					86,457	105,493	
2,210			7						
555			21					576	
85,345	8,381	9,329,424	2,368	204,345	222		1,296,645,979		129,069,946
19,882	1,787	485,434	19,137	25,739	186	7,968	3,943,879	6,653,398	
189,133	23,720	12,171,528	24,261	204,345	222		1,874,324,568		209,321,634
50,385	5,253	822,438	139,695	25,739	186	34,485	7,309,111	10,340,523	
36,800	1,692	632					68,694,160		78,102,033
8,595	364	114					865,324	3,063,487	
17,105		13,275	25		47,991		13,010		
4,405		1,253	62		18,674		753	28,921	
25,211	871	86,005	196		3,528,818		1,221,065		7,000
6,059	198	6,142	1,195		251,328	124	16,716	303,511	
79,176	2,563	99,912	221		3,576,809		69,928,235		78,109,033
19,059	562	7,509	1,857		270,002	124	882,793	3,390,919	
197			200				5,490		
37			1,000				357	3,906	
53,329	774	3,787					47,821,190		
8,942	164	432					630,461	849,047	
9,597	550	2,310	255				420,085		
2,060	115	241	1,057			25	10,877	20,996	
146,820	3,610	244,291	4		6,210		3,760,429		
33,419	736	17,275	24		2,567		55,585	188,524	
	100	450	577				249,820		
	20	52	3,898				3,747	8,560	
			45				9,800		125
		69,561	7				98	444	
		5,010					454,683		132,803
							4,893	184,001	
							1,655,827		
							18,878	19,128	
40,306	731	1,382,900	675	8,334			2,145,960		
6,663	172	101,517	2,412	700		13	22,170	205,149	
250,249	5,745	1,703,299	1,718	8,534	6,210		56,523,284		132,928
51,121	1,207	124,527	8,436	700	2,567	38	747,066	1,470,755	
21,234	2,262	14,176					152,884,534		8,782,108
4,938	420	1,843					741,790	3,280,870	
33,470	1,574	136,226	34,333	95	523,252		17,660,875		315,221
7,306	357	16,023	148,447	40	15,693	67	240,365	1,486,438	
4,496	60	393,592	44,356	128,954	10,800		5,940,170		242,089
1,083	12	14,134	176,225	10,832	6,800	4,180	54,963	612,278	
134,696	1,876	116,285	27				6,204,040		570,912
25,969	417	8,166	73			1,097	111,945	292,882	
228,018	1,207	200,383	4,402				29,798,893		100,811
49,728	242	13,335	19,677			1,084	426,774	625,673	
421,914	6,979	869,662	82,118	123,648	534,652		212,488,512		10,011,141
89,024	1,448	53,591	344,422	10,872	22,493	6,428	1,575,837	6,238,151	
949,472	36,007	14,835,393	109,318	341,728	4,117,293		2,213,264,599		258,574,736
209,551	8,470	1,007,975	493,510	37,311	215,248	41,075	10,514,814	21,509,348	

Table 25.—Fuel and Electricity Used in the Mineral

Industry	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
METAL MINING						
Alluvial Gold Mines.....	Quantity	2				
	\$	520				
Auriferous Quartz Mines.....	Quantity	701	18,326	405	1,279	160
	\$	7,028	159,425	7,537	10,173	2,399
Copper-Gold-Silver Mines.....	Quantity	6,026	106	170		49
	\$	49,352	1,934	2,247		528
Silver-Cobalt Mines.....	Quantity		1,236	261		
	\$		15,258	4,042		
*Silver-Lead-Zinc Mines.....	Quantity	15,097		10		6
	\$	72,907		320		69
Nickel-Copper Mines.....	Quantity	347	1,531	155		
	\$	2,306	8,923	2,397		
Miscellaneous Metal Mines.....	Quantity	264				
	\$	1,055				
†Non-Ferrous Smelting and Refining.....	Quantity	91,171	17,680	172		5,205
	\$	505,790	102,716	2,646		51,395
Total.....	Quantity	113,666	38,881	1,173	1,279	5,420
	\$	638,433	288,776	19,189	10,173	54,391
NON-METAL MINING, INCLUDING FUELS						
<i>Fuels</i>						
Coal.....	Quantity	584,954		108,911		
	\$	1,842,533		105,598		
Natural Gas.....	Quantity		35	7		
	\$		351	102		
Petroleum.....	Quantity	1,119				
	\$	3,369				
Total.....	Quantity	586,073	35	7	108,911	
	\$	1,845,902	351	102	105,698	
<i>Other Non-Metal Mining</i>						
Abrasives—natural.....	Quantity	208		10		
	\$	1,413		37		
Asbestos.....	Quantity	19,763	1,709	5,086		630
	\$	125,443	12,915	35,179		7,500
Feldspar and Quartz.....	Quantity	171	734			1
	\$	1,083	3,827			6
Gypsum.....	Quantity	4,341	1,080	357		287
	\$	22,115	6,225	2,678		2,600
Iron Oxides.....	Quantity	24		15		
	\$	167		240		
Mica.....	Quantity					
	\$					
Salt.....	Quantity	2,808	36,829			
	\$	11,006	153,285			
Talc and Soapstone.....	Quantity					
	\$					
Miscellaneous.....	Quantity	4,628	100	2	696	
	\$	30,038	1,300	31	2,633	
Total.....	Quantity	31,943	40,452	5,103	1,063	918
	\$	191,265	177,552	35,450	5,348	10,106
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement.....	Quantity	120,296	90,718			
	\$	652,734	440,546			
Clay Products.....	Quantity	11,752	50,440	1,142	3,082	596
	\$	72,277	306,833	8,495	8,808	4,386
Lime.....	Quantity	24,351	34,423	280		6,659
	\$	151,303	151,863	2,100		40,871
Sand and Gravel.....	Quantity	8,689	7,484		134	29
	\$	50,319	45,102		540	166
Stone.....	Quantity	1,805	7,488	695	201	55
	\$	13,324	47,096	5,319	995	563
Total.....	Quantity	166,893	190,533	2,117	3,417	7,339
	\$	939,957	991,440	15,914	10,343	45,986
Canada.....	Quantity	598,515	269,921	8,400	114,670	13,677
	\$	3,615,552	1,458,119	70,655	131,462	110,453

*Includes data on silver-pitchblende ores in N.W.T.

†In addition 230,029 tons of coal valued at \$1,675,067 and 97,097 tons of coke valued at \$957,159 were used for furnace charges.

Industry in Canada, by Kinds and by Industries, 1932

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.	\$	K.W.H.
5,482	173	5,160	2,816						12,257,230
2,341	174	431	35,374					38,840	
94,341	9,520	1,785,206	30,221	5,013			314,326,323		14,899,377
29,699	2,666	172,316	121,718	1,558		78	2,516,897	3,031,494	
56,435	2,656	310,930	1,024				128,916,568		25,341,475
16,940	687	16,012	2,159				373,604	463,463	
6,969	88	11,601	708				6,864,470		
2,093	21	1,779	3,781			16,601	80,903	124,478	
5,101	1,345	348,170	473				37,570,680		6,878,557
4,327	671	90,936	9,932				179,487	358,649	
432	1,357	32,104	88				33,449,636		
124	288	2,957	640				79,035	96,670	
1,900			500						
420			1,000					2,475	
52,646	9,476	7,641,044	3,450	162,233			978,784,118		88,811,728
16,236	1,992	310,596	16,760	17,616		12,973	3,396,674	4,435,364	
223,306	24,615	10,134,215	39,280	167,246			1,499,911,795		148,188,367
72,186	6,499	595,027	191,364	19,174		29,652	6,626,600	8,551,463	
59,742	3,773	3,362					78,529,830		47,311,377
14,557	775	420					1,102,718	3,066,601	
12,738		17,110	6		55,126		10,637		
3,546		1,811	46		26,794		262	32,912	
4,846	44	12,240	264		1,641,014		1,292,849		1,110,805
1,164	9	753	1,204		96,567		17,776	129,842	
77,326	3,817	32,712	270		1,696,140		79,833,316		48,422,182
19,267	784	2,984	1,250		123,361		1,120,756	3,220,355	
300		500	100				7,200		
62		50	500				360	2,422	
17,500	2,701	78,719					44,519,239		
2,877	525	5,651					637,213	827,303	
3,030	274	3,900	8				225,010		58,140
729	57	536	46				7,107	13,391	
58,152	542	189,405	27		4,084		4,012,565		145,297
13,931	121	10,110	162		1,674		63,310	122,926	
	35	745	441				180,474		
	7	78	3,087				2,414	5,993	
			10						
			50					50	
80	52	85,008					747,106		1,764,567
20	10	5,702					6,813	176,836	
			67				978,926		
			338				17,592	17,930	
25,659	853	864,137	339				1,322,230		33,761
4,722	182	54,554	1,177			14	15,745	110,396	
104,721	4,457	1,222,414	992		4,084		51,992,760		2,001,765
22,341	908	76,681	5,360		1,674	14	760,554	1,277,247	
87,050	826	7,386					85,630,342		
15,856	138	960					590,891	1,701,125	
11,246	959	15,614	15,764		178,650		6,386,134		62,122
2,677	246	1,869	61,149		6,280		106,783	579,803	
2,265	55	250,322	33,284	35,044	8,000		6,241,789		586,822
587	11	8,524	121,318	2,803	4,340		51,713	535,433	
63,309	570	357,306	25		3		3,579,086		
12,709	98	13,267	111		12		68,153	190,477	
176,699	2,298	40,825	2,675				24,508,215		186,285
38,641	666	2,933	10,788				300,256	420,561	
349,569	4,708	671,453	51,748	35,044	186,653		126,345,566		835,229
70,470	1,159	27,553	193,366	2,803	10,632		1,117,796	3,427,419	
745,922	37,597	12,069,794	92,290	202,290	1,886,877		1,758,083,427		199,447,543
181,258	9,344	702,245	391,349	21,977	135,667	29,666	9,615,706	16,476,484	

Table 26.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
Nova Scotia.....	Quantity 407,956	.....	.....	.....	.....	2,184
	\$ 1,424,120	.....	.....	.....	.....	13,759
New Brunswick.....	Quantity 16,494	4	.....	.....	.....	.....
	\$ 85,791	64	.....	.....	.....	.....
Quebec.....	Quantity 244,269	85,501	8,576	1,412	.....	3,102
	\$ 1,375,719	558,220	59,828	9,672	.....	26,465
Ontario.....	Quantity 153	581,177	1,166	40	.....	7,530
	\$ 1,262	3,093,399	12,908	300	47	55,204
Manitoba.....	Quantity 34,220	4,170	.....	483	.....	236
	\$ 256,524	36,497	.....	4,271	.....	2,877
Saskatchewan.....	Quantity 1,314	.....	979	43,721	.....	.....
	\$ 10,092	.....	8,308	72,575	.....	.....
Alberta.....	Quantity 154,981	.....	.....	84,422	.....	.....
	\$ 509,341	.....	.....	78,713	.....	.....
British Columbia.....	Quantity 283,837	.....	12	683	.....	2,532
	\$ 1,173,774	.....	240	3,740	.....	26,779
Yukon.....	Quantity 18	1	.....	.....	.....	.....
	\$ 54	260	.....	.....	.....	.....
Canada.....	Quantity 1,143,242	670,853	10,733	130,761	47	15,584
	\$ 4,836,677	3,688,440	81,284	169,271	300	125,084

*Includes comparatively small quantity used for lighting.

Table 27.—Fuel and Electricity Used in the Mineral

Province	Bituminous coal		Anthra- cite coal	Lignite coal		Coke
	Can- adian	Im- ported		Can- adian	Im- ported	
	Tons	Tons	Tons	Tons	Tons	Tons
Nova Scotia.....	Quantity 355,701	33	.....	.....	.....	1,140
	\$ 1,244,167	259	.....	.....	.....	7,138
New Brunswick.....	Quantity 6,903	44	.....	.....	.....	.....
	\$ 29,032	403	.....	.....	.....	.....
Quebec.....	Quantity 136,665	20,132	6,207	3	.....	1,521
	\$ 772,945	132,360	46,193	45	.....	16,781
Ontario.....	Quantity 8,779	248,559	1,145	1,276	.....	9,049
	\$ 50,523	1,313,906	16,435	10,158	.....	65,491
Manitoba.....	Quantity 21,615	682	.....	357	.....	108
	\$ 166,358	7,287	.....	2,678	.....	1,344
Saskatchewan.....	Quantity 822	.....	1,029	32,070	.....	.....
	\$ 6,263	.....	7,553	38,492	.....	.....
Alberta.....	Quantity 117,239	459	.....	80,760	.....	.....
	\$ 329,531	2,778	.....	79,079	.....	.....
British Columbia.....	Quantity 250,771	10	19	204	.....	1,859
	\$ 1,015,568	606	474	1,010	.....	19,729
Yukon.....	Quantity 22	.....	.....	.....	.....	.....
	\$ 1,695	.....	.....	.....	.....	.....
Canada.....	Quantity 898,517	269,919	8,400	114,670	.....	13,677
	\$ 3,616,082	1,457,599	70,655	131,462	.....	110,483

Industry in Canada, by Provinces, 1931

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	*Electricity purchased for power only	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.	\$	K.W.H.
104,098 23,627	1,183 247	68,166 7,165	1,503 6,064	137,288 11,532			41,788,293 534,152	2,020,666	50,110,160
20,328 4,259	201 53	127,853 10,357	11,677 44,900		12,607 5,126		513,831 13,343	163,893	880,480
231,540 49,699	6,351 1,347	2,644,836 137,065	27,967 136,584	1,483 1,542		4,633	817,188,219 3,247,038	5,607,812	115,726,936
359,730 74,625	16,744 3,732	6,118,020 378,538	37,117 170,736		105,630 26,700	31,375	583,611,005 3,659,765	7,508,844	14,573,404
63,219 14,769	2,605 534	71,695 137,065	10,640 44,509	95 40		977	173,423,109 422,411	796,076	
46,230 8,695	1,287 300	1,389,411 102,322	469 1,456				1,207,500 18,778	222,526	695,221
54,521 14,500	3,173 708	86,637 6,256	7,351 3,451		3,999,056 263,422		30,016,091 322,499	1,198,890	11,205,592
60,184 18,900	4,211 1,265	4,172,469 269,898	17,642 54,818	202,862 24,197		4,090	565,516,551 2,296,828	3,874,529	82,899,674
622 515	252 284	156,306 83,707	1,568 31,292					116,112	12,483,269
940,472 209,589	36,007 8,470	14,835,393 1,097,975	199,318 493,810	341,728 37,311	4,117,293 295,248	41,075	2,213,264,599 10,514,814	21,509,348	288,574,736

Industry in Canada, by Provinces, 1932

Gasoline	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased for power only	Total	Electricity generated for own use
				Manufactured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.		K.W.H.	\$	K.W.H.
52,217 12,509	536 118	45,313 3,316	1,027 3,921	35,044 2,803			53,819,691 773,643	2,047,874	19,732,592
8,127 1,939	108 24	42,487 3,224	7,874 32,150		21,526 10,262		848,480 19,888	96,922	
240,205 54,449	12,660 2,983	3,623,997 160,232	29,997 122,316	18,684 1,941		428	513,064,998 2,932,689	4,243,362	71,376,570
223,506 48,342	12,514 2,849	3,370,785 196,647	30,103 120,933	5,013 1,558	43,830 22,795	26,340	544,717,303 3,571,078	5,447,055	9,046,221
65,878 20,013	3,601 973	50,371 9,197	9,415 35,167				186,549,530 236,976	479,993	65,945
53,334 12,017	1,642 383	874,628 55,834					1,377,431 31,891	152,433	473,883
24,238 6,553	3,505 697	20,102 1,533	840 3,593		1,821,521 102,610		18,144,037 277,763	804,137	10,819,163
76,837 25,207	2,521 856	3,892,391 206,960	9,973 29,471	143,549 15,675		2,898	439,561,957 1,771,778	3,090,232	74,891,182
1,580 3,229	510 461	140,720 65,302	3,061 43,789					114,476	13,041,987
745,922 184,258	37,597 9,344	12,060,794 702,245	92,290 391,340	202,290 21,977	1,886,877 135,667	29,666	1,758,083,427 9,615,706	16,476,484	199,447,543

Table 28.—Power Employed in the Mineral Industry in Canada, by Provinces, 1932, with Comparative Totals for 1931

Province	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
Nova Scotia.....No.	91	36	1	128	269	397	448	717	150
H.P.	56,844	2,349	100	59,293	8,426	67,719	46,584	55,010	36,702
New Brunswick....No.	34	35	.....	69	71	140	1	72	35
H.P.	1,647	553	.....	2,200	1,218	3,418	30	1,248	1,614
Quebec.....No.	71	115	15	201	2,775	2,976	79	2,854	106
H.P.	3,426	6,836	51,705	61,967	118,539	180,506	1,842	180,381	9,552
Ontario.....No.	191	257	1	449	5,586	6,035	695	6,281	201
H.P.	17,254	10,986	50	28,290	256,596	284,886	11,231	267,827	26,013
Manitoba.....No.	22	16	.....	38	1,559	1,597	9	1,568	18
H.P.	675	875	.....	1,550	64,274	65,824	113	64,387	1,220
Saskatchewan.....No.	21	22	.....	43	85	129	55	141	21
H.P.	1,800	795	.....	2,595	2,488	5,083	715	3,203	2,495
Alberta.....No.	218	107	2	327	840	1,167	374	1,214	242
H.P.	32,771	4,624	105	37,400	30,072	67,472	11,067	41,139	28,013
British Columbia..No.	149	72	62	283	2,750	3,033	592	3,342	207
H.P.	37,782	4,293	40,782	82,867	154,994	237,551	17,769	172,763	41,298
Yukon.....No.	12	10	2	24	.....	24	139	139	12
H.P.	223	785	10,000	11,008	.....	11,008	6,595	6,595	404
Canada, 1932.....No.	809	670	83	1,562	13,936	15,498	2,392	16,328	992
H.P.	152,422	31,996	102,742	287,160	636,607	923,767	95,946	732,553	147,311
Canada, 1931.....No.	895	762	90	1,751	13,753	15,504	2,457	16,210	979
H.P.	162,936	34,878	109,084	306,898	636,681	942,979	101,776	737,857	141,873

Table 29.—Power Employed in the Mineral Industry in Canada, by Industries, 1932, with Comparative Totals for 1931

Industry	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
METAL MINING—									
Alluvial Gold									
Mines.....No.	14	7	7	28	.....	28	115	115	11
H.P.	254	435	10,048	10,737	.....	10,737	6,432	6,432	301
Auriferous Quartz									
Mines.....No.	26	72	15	113	2,261	2,374	183	2,444	66
H.P.	1,130	10,367	3,196	14,693	88,424	103,117	5,029	93,453	5,497
Copper-Gold-Silver									
Mines.....No.	.....	3	11	14	1,491	1,505	13	1,504	11
H.P.	.....	955	9,909	10,864	52,787	63,651	585	53,372	908
Silver-Cobalt									
Mines.....No.	8	.....	.....	8	46	54	.....	46	12
H.P.	375	.....	.....	376	1,553	1,929	.....	1,553	650
Silver-Lead-Zinc									
Mines.....No.	20	41	4	65	251	316	32	283	20
H.P.	7,250	1,918	604	9,772	10,931	29,703	451	11,382	3,482
Nickel-Copper									
Mines.....No.	.....	.....	.....	.....	329	329	.....	329	1
H.P.	.....	.....	.....	.....	27,876	27,876	.....	27,876	60
Miscellaneous Metal									
Mines.....No.	2	1	.....	3	.....	3	.....	.....	4
H.P.	290	50	.....	340	.....	340	.....	.....	440
Non-Ferrous Smelting and Refining...No.	32	12	21	65	4,551	4,616	824	5,375	54
H.P.	16,542	408	65,160	82,110	252,565	334,675	16,753	269,818	25,741
Total.....No.	102	136	58	296	8,929	9,225	1,167	10,096	179
H.P.	25,841	14,133	88,917	128,891	434,136	563,027	29,250	463,386	37,079
NON-METAL MINING INCLUDING FUELS—									
Fuels									
Coal.....No.	389	85	2	476	1,060	1,536	951	2,011	459
H.P.	107,757	1,096	12,000	120,853	33,925	154,778	62,600	96,525	82,806
Natural Gas.....No.	8	137	.....	145	26	171	13	39	7
H.P.	218	2,462	.....	2,680	701	3,381	202	903	270
Petroleum.....No.	37	49	.....	86	62	148	14	76	77
H.P.	2,900	2,962	.....	5,862	542	6,404	241	783	6,365
Total.....No.	434	271	2	707	1,148	1,855	978	2,126	543
H.P.	110,875	6,520	12,000	129,395	35,168	164,563	63,043	98,211	89,441

Table 29.—Power Employed in the Mineral Industry in Canada, by Industries, 1932, with Comparative Totals for 1931—Concluded

Industry	Steam engines and turbines	Internal combustion engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Total electric motors	Boilers
NON-METAL MINING INCLUDING FUELS—Conc.									
<i>Other Non-Metal Mining</i>									
Abrasives—natural No.	1			1	3	4		3	1
H.P.	80			80	13	93		13	100
Asbestos..... No.	6	3		9	500	509		500	8
H.P.	410	163		573	29,287	29,860		29,287	1,230
Feldspar and Quartz..... No.	6	7		13	21	34	12	33	12
H.P.	451	430		881	593	1,474	174	767	735
Gypsum..... No.	9	38		47	189	236	7	196	18
H.P.	893	2,260		3,153	5,912	9,065	63	5,972	1,300
Iron Oxides..... No.					5	5		6	1
H.P.					73	73		73	15
Mica..... No.			1	1		1			1
H.P.			145	145		145			50
Salt..... No.	7	4		11	31	42	145	176	7
H.P.	140	375		515	366	881	1,758	2,124	2,735
Talc and Soap-stone..... No.					18	18		18	1
H.P.					585	585		585	80
†Miscellaneous..... No.	2	11		13	54	67	16	70	4
H.P.	230	833		1,063	2,245	3,308	150	2,396	205
Total..... No.	31	63	1	95	821	916	180	1,001	53
H.P.	2,204	4,061	145	6,410	39,074	45,484	2,145	41,219	6,450
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—									
Cement..... No.	9	6		15	1,286	1,301		1,286	11
H.P.	298	205		503	75,493	75,996		75,493	427
Clay Products..... No.	76	41	3	120	461	581	11	472	79
H.P.	5,906	1,542	125	7,573	15,833	23,406	302	16,135	7,233
Lime..... No.	17	12	1	30	282	312	36	318	17
H.P.	667	528	50	1,245	5,220	6,465	507	5,727	1,156
Sand and Gravel..... No.	36	38	5	79	207	256	2	209	19
H.P.	1,781	1,422	350	3,553	7,222	10,775	45	7,867	1,037
Stone..... No.	104	103	13	220	802	1,022	18	820	91
H.P.	4,850	3,585	1,155	9,590	24,461	34,051	654	25,116	4,488
Total..... No.	242	200	22	464	3,038	3,502	67	3,105	217
H.P.	13,502	7,282	1,680	22,464	128,229	150,693	1,508	129,737	14,341
Grand total, 1932..... No.	809	670	83	1,562	13,936	15,498	2,392	16,328	992
H.P.	152,422	31,996	102,742	287,160	636,607	923,767	95,946	732,553	147,311
Grand total, 1931..... No.	899	762	90	1,751	13,753	15,504	2,457	16,210	979
H.P.	162,936	34,878	109,084	306,898	636,081	942,979	101,776	737,857	141,873

† Includes data for Peat.

Table 30.—Accidents in the Mining Industry in Canada, by Provinces*, during 1932

Cause of Accident	Nova Scotia		New Brunswick		Quebec		Ontario		Saskatchewan		Alberta		British Columbia		Canada	
	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal	Fatal	Non-fatal
UNDERGROUND—																
Falls of roof or face.....	7	257	3	101	1	48	4	84	1	19	9	45	9	244	31	798
Mine cars and locomotives.....	2	171	3	61	3	39	1	95	2	38	1	44	3	127	15	575
Gas and dust explosions.....			2													9
Explosives.....				19	3	11	6	14		2		7		8	9	61
Electricity.....	2	274		105	1	124	8	900		126		28	6	541	17	2,098
Miscellaneous.....	1															1
Total.....	11	702	5	291	8	222	19	1,093	3	186	10	127	18	921	74	3,542
SURFACE—																
Haulage and cars.....		23		19		43	1	10		8	1	7	1	7	3	117
Machinery.....		9		10		51		34	1	24				9	1	137
Miscellaneous.....		99		19	3	143	5	315		8		23		162	8	769
Total.....		131		48	3	237	6	359	1	40	1	30	1	178	12	1,023
Grand Total.....	11	833	5	339	11	459	25	1,452	4	226	11	157	19	1,099	86	4,565

* Data for Manitoba not available.

CHAPTER TWO

THE GOLD MINING INDUSTRY IN CANADA

(With tables showing the production of gold)

1. General Review.
2. Review of the Gold Mining Industry in Canada by Areas.
3. The Alluvial Gold Mining Industry.
4. The Auriferous Quartz Mining Industry.
5. The Copper-Gold-Silver Mining Industry.
6. Commodity Statistics—including tables showing production by provinces, imports, exports, and world output of gold.

1. General Review

CANADA

Definition of the Industry.—Gold mining in Canada is classified into three principal industries—(a) the recovery of gold from the gravels and sands of stream channels or beaches or what is defined as “The Alluvial Gold Mining Industry”; (b) the recovery of lode gold, which is named “The Auriferous Quartz Mining Industry” and in which industry the gold is usually the most important economic constituent of the ores mined and quartz the predominant gangue mineral; (c) gold is often found in various other mineral deposits, more particularly in those of copper, and for this reason the review of Canada’s “Copper-Gold-Silver Mining Industry” is included here to complete a more comprehensive survey of the Canadian gold mining industry.

Historical.—The early history (1850-1895) of gold production in Canada is largely confined to the placer operations of the pioneer prospector in British Columbia and it was from this source that most of the metal was derived until the discovery, in 1896, of the extremely rich gravels of the Klondike river in the Yukon Territory; between 1898 and 1905 gold to the value of more than \$100,000,000 (4,838,000 fine ounces) is stated to have been obtained from the placers of the Bonanza, Eldorado, Hunker, Dominion and Sulphur Creeks. Almost coincident with this western activity was witnessed the Lake of the Woods discoveries in Ontario and renewed activity on the Nova Scotia quartz veins. The past fifteen to twenty years, although witnessing the decline of the alluvial gold industry, have given to the nation the highly productive auriferous quartz mines of the Porcupine and Kirkland Lake camps in Ontario and of the Portland Canal district in British Columbia. The base metal mining industries are now contributing important and increasing quantities of gold to Canada’s total production. This has been most highly reflected in the growing gold production originating in the recent expansion in copper-nickel and copper-gold mining industries; the increase from the latter industry is strikingly exemplified in the recovery of this metal as the result of extensive mining and metallurgical developments at the Noranda copper mine in the province of Quebec.

Sources.—The great part of the gold of Canada comes from the Canadian shield, an immense area of precambrian rocks extending from the Labrador Coast westward almost to the mouth of the MacKenzie River. The area of the shield is roughly 1,825,000 square miles, almost half of Canada—the precambrian shield is not only our present greatest reservoir of the precious metal, but in all probabilities the most fruitful region for discovery of new deposits.

Production of gold during 1932 from all sources in Canada amounted to 3,044,387 fine ounces valued at \$62,933,063 as compared with an output of 2,693,892 fine ounces worth \$55,687,688 in 1931.

The total 1932 production was obtained from the following sources: gold contained in crude bullion made by gold mines, 2,412,829 fine ounces; alluvial gold, 56,876 fine ounces; gold in blister and anode copper and in base bullion made at Canadian smelters, 489,558 fine ounces; and the estimated recovery of gold in ores, matte, slags, residues and concentrates exported to foreign metallurgical plants, 85,124 fine ounces.

Seven provinces and Yukon Territory produced gold in 1932 as follows: Nova Scotia, 964 fine ounces; Quebec, 401,105 fine ounces; Ontario, 2,280,105 fine ounces; Manitoba, 122,507 fine ounces; Saskatchewan, 11 fine ounces; Alberta, 83 fine ounces; British Columbia, 199,004 fine ounces; and Yukon, 40,608 fine ounces.

Importance of the Industry.—The 1932 Canadian gold production constituted a new high record in the gold mining industry of the Dominion and for the third consecutive year established Canada in second position among the gold-producing countries of the world. Gold now constitutes the most valuable mineral output of Canada, its value having first surpassed that of coal in 1931. The value of gold represented 34.4 per cent of the total value of the mineral production of the Dominion in 1932 and in the same year auriferous quartz mining provided employment for 10,442 persons, distributed \$17,686,584 in salaries and wages and consumed \$3,031,494 in fuel and electricity. The discovery and development of our more important Canadian gold deposits have not only contributed directly to the wealth of the nation but have assisted materially in the colonization of virgin lands, the harnessing of important water powers, and the general development of our northern natural resources.

The almost phenomenal decline in commodity prices during the past three years has not only benefited the established gold producer but has stimulated investigation as to the possibility of profitably operating on lower grade gold ores that were heretofore considered of doubtful commercial value. The suspension of specie payments by Great Britain in 1931 was followed by a heavy discount of the Canadian dollar in New York and reacted to the benefit of the Canadian gold miner. Exports of gold from Canada are permitted since October, 1931, only under licence, the Canadian government purchasing the gold output of practically all Canadian mines.

2. Review of the Gold Mining Industry by Areas

NOVA SCOTIA

The recorded gold production of Nova Scotia from 1862 to 1932 inclusive amounted to 925,172 fine ounces valued at \$19,125,085. Mining of this metal in the province dates back to the early sixties. Annual yields varying from 6,863 fine ounces to 30,348 fine ounces are recorded from 1862 to 1902. In 1904 production fell to 10,362 ounces and remained close to this quantity until 1910, since then there has been no appreciable increase in production.

Fine gold contained in bullion shipped from Nova Scotia to the Royal Canadian Mint, Ottawa, totalled 964 ounces in 1932 as compared with 460 ounces in 1931.

Lode gold mining appeared to be rather more widespread than during the past few years. Small parcels of crude gold were received by the Royal Canadian Mint at Ottawa from Mount Uniacke, Goldboro, Oldham, Enfield, Goldenville, Wine Harbour, Upper Musquodoboit, Nine Mile river, Shubenacadie, Stewiacke, Montague Mines, Scraggy Lake, Kempt and Tangier. In the Renfrew district, Hants county, the Renfrew Gold Mine was active during the greater part of the year; underground work consisted of cross-cutting and sinking together with the cleaning up of old levels, while some crude gold was recovered by amalgamation. The United Goldfields of Nova Scotia Limited, carried on considerable development work at the King Fissure mine in the Brookfield district, Queens county. This consisted of 400 feet of shaft sinking, 203 feet of cross cutting and 487 feet of drifting. The company had in the previous year completed 4,151 feet of diamond drilling; the mining plant at this property operated on purchased electricity. The East Goldbrook mine of the Stormont district in Guysboro county conducted development work and erected mining machinery.

In the Nova Scotia deposits gold occurs usually in the free state and sometimes as rich concentrations of native metal in comparatively narrow quartz veins or disseminated in multiple vein systems called belts. Values in some ore bodies are associated with arsenopyrite and antimony. The veins occur, in most instances, in anticlinal folds of slate and quartzite.

Hydro-electric power is now available throughout a large part of the province.

NEW BRUNSWICK

There was no production of gold in this province in 1932. The New Brunswick Department of Lands and Mines reports that three or four parties continued the search for gold and silver throughout the year, more particularly around the headwaters of the Tobique, Nepisiguit and Upsalquitch rivers in Northumberland and Restigouche counties, and in Albert county at the head of the Salmon river. Small amounts of placer gold have been found in both these areas and geological conditions appear favourable. The provincial government's diamond drill worked on a claim located on the north branch of the North West Miramichi river; quartz veins were investigated here for gold and silver values.

QUEBEC

Six years ago the gold production of Quebec approximated \$76,000 annually and with the development of the Rouyn-Harricana mines in the western part of the province it reached \$6,200,000 in 1931 and almost \$8,300,000 in 1932. There are now four important auriferous quartz mines producing gold in Quebec; the Granada mine in Rouyn, the O'Brien Cadillac mine in Cadillac, the Siscoe mine in Dubuisson and the Bussiere or Treadwell Yukon property in Louvicourt. Several others are in an advanced state of development. During 1932 the Bussiere three compartment shaft was sunk to a total depth of 677 feet and a total of 4,566 feet of development work done on four levels; good ore has been found on all levels with the best on the bottom or 650 level; the mill started experimentally in September. As mine development and preparatory work progressed the quantity of the mill feed increased and the grade improved from \$1.57 per ton in October, 1932, to \$5.02 in February, 1933. Milling operations at the property will be stepped up to the mills' 150 ton capacity.

Beattie Gold Mines Limited, continued development of what has been reported as one of the largest low grade gold ore deposits so far located in Canada. This property is situated in Duparquet township some 13 miles east of the Ontario boundary; in April, 1932, an exploration shaft was commenced and at the 220 foot level the ore zone was stated to be over 100 feet wide and averaging \$4.41 a ton in gold. The company commenced erection of a milling plant of 800 tons (flotation) capacity; this commenced operating in May, 1933. Concentrates are shipped to the American Smelting and Refining Company.

The Siscoe Gold Mines Limited, with property in Dubuisson and Varsan townships operated continuously throughout 1932. The company commenced the installation of flotation equipment and conducted extensive underground development work.

Granada Gold Mines Limited, located in the southwestern section of Rouyn township, was in continuous operation throughout the year. In the latter part of May a cyanide unit was added to the mill and preparations were made to increase production.

The new mill at the O'Brien Cadillac mine in Cadillac township commenced operations in October. Crude bullion was recovered by amalgamation; under ground and surface work were carried on during the entire year.

Extensive mining operations were conducted in Cadillac township by Canadian Pandora Gold Mines Limited; underground work at this property comprised shaft sinking, cross cutting and drifting. An interesting gold discovery was made in the summer of 1932 on the property of McWatters Gold Mines Limited located in Rouyn township. This occurrence was explored by diamond drilling and surface work; results are reported as encouraging. Sullivan Consolidated Mines Limited were active on their property in Dubuisson township; considerable underground development was completed at the mine, this was in addition to diamond drilling operations.

From 1877 to the close of 1932 the province of Quebec produced from all types of ore deposits 735,653 fine ounces of new or primary gold. This was valued at \$15,207,258. It is interesting to note that at the end of 1927 the total production for the province was only 41,997 fine ounces worth \$868,117 as compared with the twelve months output of 401,105 fine ounces valued at \$8,291,576 in 1932. This pronounced increase during recent years represents the rapid expansion in the mining of auriferous ores in the northwestern part of the province, especially does it reflect the successful development of the Horne mine by Noranda Mines, Limited.

ONTARIO

The Ontario Department of Mines reports that apart from the steadily increasing output by the well-established mines of Porcupine and Kirkland Lake, the outstanding features of the year have been the development of smaller mines in other parts of the province and an increase in prospecting activities. The poor market for base metals has been a factor in concentrating the prospectors' operations on rock formations considered favourable for gold occurrences. During 1932 the Ashley mine in Bannockburn township was brought into production; the Croesus mine in Munro township was re-opened and efforts made to locate the extension of the high grade vein mined in former years. Operations in the Swayze area were extensive and good surface showings opened up on the Kenty, Derragh and other properties. Important exploration work was commenced in February, 1933 by Hollinger Consolidated Gold Mines, Limited on the large ($2\frac{3}{4}$ acres in area) low grade ore body of the Young-Davidson Mine in the Mattachewan area, preliminary investigations indicate values around \$2.50 a ton, tests on the ore reveal good extraction by cyanidation and flotation.

In the Michipicoten area the Parkhill and Minto mines produced throughout the year while the new Goudreau made a small shipment of gold bullion. Encouraging diamond drilling results were obtained at Little Long Lac in Thunder Bay and at the close of the year freighting was conducted by airplane to the Central Patricia mine located some twenty miles north of Lake St. Joseph in the Crow River area. It is the intention to erect a small mill on this property.

The gold production by the Porcupine camp amounted to 7.7 per cent above that for 1931. At the Hollinger mine operations were conducted on all levels from the surface to the 3,950 foot level. 42 per cent of the ore milled came from above the 800 foot level and 975,000 tons of backfill were placed during the year. Ore put in sight below the 2,750 foot level amounts to over \$3,200,000, the grade being approximately \$9.00. The company reports ore conditions on the lower levels as most interesting with the apparent continuance (extension) of the ore zone to the west. During 1932 the Hollinger mill treated 1,754,863 tons of ore of an average grade of \$6.16, the net value recovered totalled \$10,394,409. Cyanide consumed per ton of ore totalled 0.461 pounds; zinc consumed per ton of ore 0.044 pounds; zinc consumed per ton of solution 0.043 pounds; lime consumed per ton of ore 1,964 pounds; lead acetate per ton of ore 0.010 pounds. A total cost of \$4.1710 per ton of ore mined and milled was reported for 1932, this was made up as follows: \$3.0296 for mining, \$0.6122 milling, \$0.2802 Workmen's Compensation (includes silicosis assessment), \$0.0169 marketing bullion, insurance \$0.0076, surface charges \$0.0386 and \$0.1859 for general miscellaneous charges and administration. Ore reserves of the Hollinger mine on December 31, 1932, were reported at 6,049,548 tons with a total value of \$45,492,076 or an average value of \$7.52 per ton.

Dome Mines Limited reports that 576,850 tons of ore were hoisted in 1932; of this 536,450 tons were sent to the mill and treated and 40,000 tons of waste were dumped on the surface. In addition 13,700 tons of waste were disposed of in old stopes. The 536,450 tons milled yielded bullion worth \$4,040,317; the yield per ton being \$7.532. During the year 26,949 feet of diamond drilling were completed, considerable of this being on the 23rd level where interesting and encouraging results were obtained. Of the tonnage milled the stopes yielded 483,500 tons averaging \$8.2618 per ton and development work yielded 52,900 tons averaging \$4.8113, a total of 536,450 tons. The ore drawn from the Dome extension ground during the year was 110,812 tons containing \$691,695 or \$6.2421 per ton. Dome ore drawn from stopes wholly in the sedimentary area yielded 165,973 tons containing \$1,631,645, an average of \$9.8307 per ton; ore from stopes wholly in the greenstones or partially so yielded 317,577 tons containing \$2,363,337, an average of \$7.4418 per ton. The expenditure on mining was \$709,004 or \$1.322 per ton; operating costs for the year were \$3.882 per ton milled as against \$3.482 in 1931. Ore reserves are estimated at 2,000,000 tons in 1932; this includes 723,960 tons of broken ore, ore in the sediments in estimated at 285,000 tons and ore in the greenstones at 1,715,000 tons.

At McIntyre Porcupine mines, during the fiscal year ending March 31, 1933, 736,300 tons of ore, of an average assay value of \$7.70 per ton were treated, resulting in a recovery of bullion with a net value of \$5,957,216. Total operating costs amounted to \$4.1621 per ton of ore milled and were made up as follows: exploration \$0.0963; development \$0.4465; breaking and stoping

\$2.6108; milling \$0.7949; heating and maintenance \$0.0902 and administration and general expense \$0.1234. Ore reserves, including broken ore, were reported at 2,605,066 tons of an average assay value of \$7.70 per ton. The new plant of the company was in continuous operation during the year and unit costs were gradually reduced. An internal vertical shaft was started from the 3,875 foot level. The new shaft and the necessary hoisting equipment are so planned that development can be carried to the 7,000 foot horizon.

Coniarum and Vipond Mines operated continuously throughout 1932; the Buffalo-Ankerite in the Deloro township resumed operations in May and later increased its mill capacity to 325 tons daily. The March mine closed July 19th and the Hayden mine operated a test mill during May and June. At Triple Lake, about 20 miles south of Porcupine camp, some rich ore was recovered from the John Spence property. The Croesus, in Munro township, operated in September, October and November, recovering small quantities of gold from the ore dumps.

Gold production in the Kirkland Lake area showed a 9.4 per cent increase over 1931. Lake Shore Mines Limited report that for the fiscal year ending June 30, 1932, the company treated 834,434 tons of ore yielding bullion to the amount of \$12,356,759. This shows an increase of 135,810 tons of ore milled over the previous fiscal year with a corresponding increase in bullion of \$3,203,824. The total tonnage milled during the year was made up of 83,668 tons of ore from development and 750,766 tons from milling. The broken ore reserves amounted to 258,914 tons valued at \$4,490,000. The successful operation of the cut and fill method of mining in the underground work has raised the grade of ore and the improved extraction secured by oil flotation and other mill refinements has resulted in larger earnings for the company. During the year No. 1 shaft was carried to a depth of 3,725 feet and at the same time raising on No. 3 shaft from the 3,075 and 3,200 foot levels was in progress. Costs per ton of ore milled were as follows—development \$1.198; mining, \$2.529; milling and refining \$1.188; marketing bullion \$0.078; general and administrative \$0.248; depreciation \$0.884; provision for provincial and Dominion taxes \$1.192 or a total cost per ton of \$7.317.

Teck-Hughes Gold Mines Limited reported 475,700 tons of ore treated during the fiscal year ending August 31, 1932. Bullion amounting to \$5,953,687 or \$12.52 per ton was recovered. The gross revenue was \$6,824,239 or \$14.35 per ton. Including the sum of \$303,658 charged for depreciation on buildings and fixed plant, the total operating cost was \$2,663,067 or \$5.60 per ton. The following is an analysis of operating costs:

	Cost per ton of ore treated	Cost per ounce of gold produced
	\$	\$
Development and exploration.....	1.25	2.062
Mining.....	2.22	3.661
Milling.....	0.99	1.641
General expense.....	0.50	0.824
Examination of new properties.....	0.00	0.004
Depreciation.....	0.64	1.054
Total.....	5.60	9.246

At the end of the fiscal year the south shaft extension had been sunk to a depth of 4,864 feet and station cutting for the 40th level had been commenced. No. 2 winze reached a depth of 4,611 feet. The technical estimate of "positive ore" reserve at September 1st, 1932, was broken ore, 335,135 tons of an average grade of \$12.03 and 291,354 tons of blocked ore of an average grade of \$13.38.

Kirkland Lake Gold Mining Company reported a gold production valued at \$592,451 in 1932. Shaft sinking from 4,750 to the 4,900 level was commenced at the beginning of the year. At 4,900 a main haulage level was driven 1,000 feet south to No. 2 winze; the No. 2 winze was sunk 543 feet; this provides four new levels that will be worked during 1933. The main development of new ore was on the 4,900 level. Daily mill tonnage totalled 155 and averaged \$9.28 per ton.

One of the more important developments at the Wright-Hargreaves mine during 1932 was the confirmation of the continuous character of the north vein ore body on the two lowest levels, the 2,850 and 3,000. At the end of the year it was reported that 1,500 feet of ore on each level had been opened up with ore still to be developed at each end. Ore reserves were reported as on December 31, 1932, at 951,939 tons with an average value of \$13.54 per ton. The company announced that the mill capacity would be increased to 1,000 tons and that flotation treatment will be adopted.

Toburn Gold Mines Limited, operating the old Tough-Oakes-Burnside property at Kirkland Lake stated that ore production and milling in the cyaniding plant of approximately 100 tons daily capacity, commenced in August, 1932, and to December 31, there had been mined and milled 14,689 tons of ore averaging 0.723 ounces of gold per ton and yielding as profits, before any charges for depreciation or ore depletion, \$92,589. Some additional ore was found and opened up by underground development; ore reserves as at December 31, 1932, were 29,200 tons of approximately the same average grade as that milled in 1932. The Sylvanite operated continuously throughout the year, daily mill tonnage was 265 and averaged \$8.46 per ton. Development on the Macassa to the west of the producers was continued during the period; ore is being opened up on the 2,000, 2,175, 2,325 and 2,475 foot levels, diamond drilling has proven continuity of ore to greater depths than now explored. The Barry-Hollinger, about six miles south of the Kirkland Lake area, operated at 96 tons daily capacity with an average recovery of \$4.59 per ton.

The Ashley Gold Mining Co. Ltd., operating the Ashley mine in Bannockburn township, some forty miles west of the main Kirkland Lake area, completed in the early part of the year a three compartment inclined shaft to 570 feet; so satisfactory were the early results from drifting on all levels that decision was made to install a mill and the necessary equipment for a cyanide plant of 150 tons daily capacity was hauled in. Construction of plant began in May and was completed in August, gold production commencing in September. The Ashley vein, upon which practically all development has been concentrated to date, has proved down to the 500 foot level to be a narrow high grade vein, the average gold value being approximately \$15.00 over a width of 30 inches. On the 500 foot level a length of 950 feet, in practically one continuous oreshoot, has been proven. Owing to the narrow character of the Ashley vein, special stoping methods and hand sorting of waste are required to avoid dilution from overbreak of low grade wall rock.

In the Lake of the Woods area Kenora Prospectors and Miners limited carried on development on its Cedar Island property and on the strength of the encouraging results acquired the adjoining Mikado mine where drifting was commenced on No. 9 level 500 feet below the surface. The Moss mine near Kashabowie was operated in 1932 at an average rate of 82 tons per day and \$6.85 per ton recovery. The Minto and Parkhill in Michipicoten, while relatively smaller in mill equipment, each treated ores of \$8.72 grade. At Schreiber several properties were being operated, including the McKellar-Longworth by Schreiber Gold Mines Limited and the Harkness Hays.

During 1932 the recovery of gold at the Howey Mine, Red Lake Patricia district amounted to \$1,268,780 from which an operating profit (before depreciation, pre-production charges and taxation) of \$470,412 was realized. The cost per ton of ore treated in 1932 was \$2.471 as compared with a corresponding cost of \$3.126 during the preceding year. The mill treated 284,664 tons of an average value of \$4.21 per ton, the recovery was 93.6 per cent. A plant extension has been recommended, which will increase the capacity of the mill to approximately 1,300 tons per day; the company report that this will not only insure a larger profit on the ore reserves but will also open up as a commercial possibility, a large block of ore above the 1,000 foot level lying west of the shaft. The broken ore reserves above the 1,000 foot level on the 31st day of December amounted to 206,150 tons. The reserve of unbroken ore of a similar grade above the same level amounted to approximately 500,000 tons. In addition to these reserves, there is a body of ore lying to the west of the shaft and above the 1,000 foot level.

Production of gold in Ontario from all sources from 1877 to 1932 inclusive amounted to 19,227,241 fine ounces valued at \$397,462,338.

MANITOBA

Production of gold in Manitoba from auriferous quartz ores was stimulated in May, 1932 through the commencement of milling operations at the San Antonio mine in the Rice Lake section. Crude gold was recovered by both amalgamation and cyanidation. It is reported that work in the latter part of the year had materially increased the ore in sight and that diamond drilling operations revealed excellent values in seven intersections all in new territory. The Central Manitoba mine, located in the Long Lake district, was in continuous production throughout the year, in addition to underground development the company conducted considerable diamond drill exploration. At Herb Lake the North British Mining and Milling Company Limited commenced milling in April and operated the Ferro mine steadily throughout the remainder of the year. Mining operations were chiefly confined to the surface. A relatively small tonnage of ore was shipped to the Flin Flon smelter from the North Star mine situated at Morton Lake. Auriferous ore was also shipped to the same smelter from the Dominion group located in The Pas mining division; this was extracted by C. H. Brander of Sherridon, Manitoba.

During 1932 operations by Island Lake Mines Limited, at Island Lake, consisted of exploration work and erection of camps. Extensive tests were made on this ore and equipment purchased to place the property in production on a scale of 50 tons per day. It is hoped that production on a basis of about 30 tons per day will begin in the summer of 1933. Drilling during the winter from the ice disclosed a zone on west island similar to that on gold island.

A promising gold discovery was made at God's Lake, north of Island Lake, during the summer of 1932. It was reported that the break on which the original discovery was made had been traced for a considerable distance, the zone being approximately 100 feet wide and containing, in places, veins ranging from 4 to 5 feet in width. Production of gold in Manitoba from all sources from 1917 to 1932 inclusive totalled 198,203 fine ounces valued at \$4,097,218.

SASKATCHEWAN

Surface and underground work was carried on at the Amisk Gold mine situated at Beaver Lake. No production was reported from this property. Emmet, Irving, Kenward Limited, conducted some development work on a property in the Beaver Lake district; it is stated that a small mill will be installed in 1933.

ALBERTA

There is no record of any important gold production from Alberta. Efforts to profitably recover comparatively small quantities of gold contained in the sand and gravels of the Saskatchewan river have been attempted and in 1932 the McLeod River Mining Corporation installed and adjusted a gold dredge on the McLeod River; two small shipments of crude gold were made during the year.

BRITISH COLUMBIA

The interest directed to gold mining, both lode and placer, resulted in a larger number of prospectors being in the hills than in former years. About 9,000 provisional free miners' certificates were issued in addition to the ordinary ones. New lode discoveries were reported from several parts of the province, which will require exploration before their economic importance can be determined.

Premier Gold Mining Company Limited mined 221,718 tons (dry weight) of ore with an average assay content of 0.36 ounces gold and 8.3 ounces silver and at the close of 1932 the combined broken and unbroken ore reserves of the Premier mine were 98,156 tons less than at the end of 1931; 123,562 tons of new ore were found and opened up by exploration and development during 1932. The company reports that the Premier ore shoot bottoms as to commercial values slightly above the 5th level with a few roots of profitable grade persisting to the 6th level. The total of the estimated broken and unbroken ore reserves down to the 6th level of the present mine workings is 155,467 tons averaging 0.31 ounces of gold and 6.9 ounces of silver. The Prosperity and Porter Idaho mines at Marmot river remained closed throughout 1932. Silverado and Dunwell mines in the Portland Canal division made shipments of silver and gold-bearing ore to the Tacoma smelter.

Near Barkerville in the Cariboo district the Cariboo Gold Quartz Mining Company included among its activities the construction of a cyanide plant; the property was reported to be in production on January 10, 1933.

Developments at the Union mine consisted of the extension of No. 1 and No. 3 tunnels and upraises in various directions where indications of ore were found, about 30 men being employed; at the Homestake where the mineral constituents and country rocks are similar to the Union the property was further developed by sinking a shaft approximately 85 feet, values are reported to vary between \$5 and \$35 per ton; a mineral zone about 300 feet long was outlined by diamond drilling. Waterloo Gold Mines Limited, cleaned out No. 4 tunnel, reconstructed several miles of road and shipped a car of mixed ore to the Trail smelter. This assayed \$30 in gold and \$13 in silver per ton. Three carloads of roughly sorted ore averaging \$12 per ton in gold were shipped to the smelter from the Carmi mine in the Greenwood division; practically all of this ore was taken from the development headings. At the Dividend and Lakeview in the Osoyoos division ten stamps, two wilfley tables and a jaw crusher were placed on the property and about twelve tons of concentrates shipped by truck to the Tacoma smelter. Most of this ore was taken from dumps or the old "Glory Hole". The Oliver property, 3 miles north of Fairview, shipped some fifteen tons of picked ore to the smelter; work was commenced here at the mouth of an old tunnel where free gold occurs in association with pyrite in a quartz vein. Some exploratory work was conducted at the Hedley mine where a cross cut about 240 feet long was driven under the Sunnyside ground, work ceased with the cold weather. Shipments of ore were made from the Summit claim on Oro Fino mountain by the Parvenue Mines Limited, gold bullion was also recovered at the mill, the shipping ore was reported to average about \$70 per ton. The Oro Fino property, adjoining the Parvenue, shipped about 76 tons of gold quartz ore for treatment in the Parvenue mill; this averaged about \$20 per ton in gold. The Dawson-Aurum mines in the Yale division and under option by Consolidated Underwriters Limited, reconditioned the old mill, conducted development work and shipped about 115 tons of roughly sorted ore, gold being the chief value. The Home Gold Mines adjoining the Aurum drove a new cross cut some 182 feet, ore was sorted and sacked at the rate of about one ton a day; this is expected to average \$45 per ton, shipments are planned for 1933. In the Clinton mining division the Big Slide Mining Company completed considerable development work on a quartz vein containing pyrite, arsenopyrite and occasional segregations of chalcopyrite; values are reported at from \$15 to \$20 per ton.

In the Nelson mining division the Reno mine completed its construction programme, this comprised work on the mill, power and aerial tram units. Suspension of production pending these improvements has been the chief factor causing the decreased gold output in this district. At the property of the Gold Belt Mining Company adjoining the Reno holdings, tunnelling operations were started and work was resumed at the Perrier near Nelson. Active mining commenced at the Yankee Girl on March 1st and continued at a steady rate for the remainder of the year. Ore was shipped to Trail, the principal values were in gold with minor amounts of silver, lead and zinc. Small shipments of exceptionally high grade ore were made from the I.X.L. near Rossland.

None of the properties in the Phillips arm section were under operation after the Alexandria closed down early in the year. An interesting gold discovery was made by Geo. Morrison on what is known as the Mary Mac claims in the Lillooet division. The property is reported to possess outstanding possibilities of developing into importance. At the Pioneer the main vein was picked up by cross cutting from the new shaft on all the lower levels. The new 300 ton mill was started in December and operated satisfactorily under winter conditions. A recent discovery of a pocket of high grade ore on the 8th level produced a ton of ore that yielded over \$50,000 in gold, making a total output of 400 pounds of gold for the last two weeks of the year. The Lorne mine operated by Bralorne Mines Limited, has conducted some very interesting development, in that work on the 10th level has cross cut the fault zone; and a cross cut to the southwest of about 300 feet has located the vein west of the fault. This opens up a new and very promising area for development. Work on the California vein by the Bridge River Exploration Company consisted of drifting and cross cutting; it is reported that the tonnage indicated by vein widths will permit large-scale operations on fairly low grade mill feed.

The total production of gold in British Columbia from all sources from 1858 to 1932 inclusive amounted to 10,390,874 fine ounces valued at \$214,798,467.

YUKON

Prospecting on Mount Freegold in the Carmacks division was continued in 1932, an average of about 8 men being employed. W. J. Langham and A. Brown operating in this area claim to have found encouraging ore. Work on the Tinto Hill group was discontinued, shallow shafts are reported to have now proven the vein for about 500 feet in length and to average 3 feet in width; gold assays are stated to be interesting.

The total alluvial gold production, together with a small quantity of the metal contained in silver-lead concentrates, amounted to 40,608 fine ounces in 1932. This output is in sad contrast to those of the old "boom" years in the Klondike when, during 1900, 1,077,553 fine ounces were recovered. Following the sensationally rich discoveries of '96 and '97 the production mounted rapidly for a few years. Then came a period of lessened individual recoveries, depleted values and the entry of large scale operators. Modern dredges and systematic hydraulicicking largely accounted for an increased production from 1909 to 1913. During the last decade the annual placer gold production in the Yukon has been much less than in former years.

The output of gold in the Yukon from 1885 to 1932 inclusive, amounted to 8,970,563 fine ounces worth \$185,437,645.

(3) The Alluvial Gold Mining Industry

It is very difficult to secure complete information on alluvial mining in Canada since placer fields are mostly remote and except in a few instances are operated by individuals of usually no fixed abode. Dredging and hydraulicicking companies operating in the Yukon Territory send annual returns to the Bureau and with the aid of the Mining Lands Branch, Department of Interior, under whose regulations mining is carried on in this territory, more definite information is obtainable.

Production of alluvial gold in Canada is confined chiefly to British Columbia and Yukon. Comparatively small quantities of placer gold have also been recovered in Alberta and Quebec.

QUEBEC

Placer gold was recovered as early as 1823 from the gravels of the Chaudière River basin, the deposits located some 40 to 50 miles southeast of Quebec City, being considered of both post-glacial and pre-glacial origin; production from this field was chiefly from 1870-1885. Placer mining activities in Quebec during 1932 were confined to the Seigneurie Rigaud Vaudreille (Beauce) and to Ditton township, Compton county. Crude alluvial gold was recovered in the first named district while prospecting only was conducted in Ditton township.

ALBERTA

Placer gold occurs in several streams in Alberta. The metal was discovered on the North Saskatchewan in 1859 or 1860. The gold in this river originates in strata of early tertiary or upper cretaceous age and has been found from about 50 miles above Edmonton nearly to Battleford in Saskatchewan. Recoveries on the Saskatchewan are principally made in rockers. During 1932 small quantities of crude alluvial gold were reported by small operators working on the Peace River or its tributaries. The McLeod River Mining Corporation installed and adjusted a gold dredge on the McLeod River; this handled 12,000 yards of ground, including silt removed before entering the gravel beds. The company was unfortunate in breaking part of the bucket line after only 183 hours of operation. Work was continued on the problems of table recoveries and re-concentration. Two small shipments of crude gold were made from the property in 1932. It is interesting to note that the 1932 output contained a small amount of platinum.

BRITISH COLUMBIA

Alluvial gold is rather widespread in British Columbia; the more highly productive areas include those of Atlin, Cariboo, Cassiar, Fraser River and Tulameen. Placer-prospecting was stimulated in 1932 by the issuance by the Department of Mines, B.C., of provisional free-miners' certificates free of charge.

On Graham island, in the Queen Charlotte mining division, interest in sluicing of beach sands by individuals has increased and with the recent incorporation of Gold Beach Mines Limited, operation on a 500 yard daily capacity of the Cape Fife beach sand area is planned.

In the Stikine and Liard Mining divisions, placer gold operations constituted the bulk of the mining activity in 1932; boulders and dredge construction not adapted to the type of ground necessitated the cessation of the Barrington dredging operation on Barrington river. Efforts are, however, reported being made to overcome the difficulties. The year 1932 witnessed exceptionally active alluvial mining operations in the Atlin division not only in the older areas but in virgin territory. On Squaw Creek, in the Tatshenshini river area of the extreme northwesterly part of the province, a total of 10 white and 17 Indian miners, including one woman, were engaged in sluicing and recovering from about \$5.00 to \$60.00 a day from shovelling of the bed-rock gravel; during the 1932 season the largest nugget reported as found in this creek up to the end of August was valued at \$130.00; during the season several from \$20.00 to \$75.00 in value were found. Placer operations in the Manson section of the Omineca mining division included those of Germansen Placers Limited on Germansen creek. This property reached production at the close of the season, while in the same district the Consolidated Mining and Smelting Company brought in over a new road a Sauerman slack-line plant for installation on its property on Slate Creek; a number of prospectors were engaged on Kleanza and Lorne creeks (tributaries of the Skeena river); on Dog creek (tributary of the Stuart river) and on Jimmay creek (tributary of the Osilinka river). It is stated by the British Columbia Department of Mines that a placer gold discovery on the McLeod river gives promise of assuming importance.

Great placer activity was general throughout the Cariboo mining district during 1932. Included among the larger operations were those of the Lowhee Mining Company, Limited, on Lowhee creek; New Waverley Hydraulic Mining Co. Ltd., on Grouse creek; and Consolidated Gold Alluvials of B.C. Ltd., at Wingdam on Lightning creek. A large number of the smaller hydraulic operators were active, promising results being attained on several properties. Encouraging developments occurred in the vicinity of Ahbau Lake and in Beaver Pass. Among the more promising of the new placer discoveries were those of G. S. Gagen, of well-worn fairly coarse gold on a rock bench on Gagen creek; coarse gold on false bed rock of the North fork of Hixon creek by A. Nani; coarse gold on false bed rock on Terry creek by G. Lahti and fairly coarse gold, on true bed rock on Skaret creek, about eight miles east of Prince George.

Alluvial gold mining was also general throughout the Quesnel Mining division and among the larger operations may be mentioned those of Moorehead Mines, Limited, near Hydraulic; Hiren Placers Limited, at Bullion mine; B. Boe, on Cedar creek; and Placer Engineers Limited, on Four Mill creek near Keithley. New placer operations inaugurated in the Quesnel district in 1932 were those of C. and S. Mining Company, Limited, on the north fork of the Quesnel river, this company employed upwards of 75 men during the season, installing a hydraulic system; Ruby Gold Mines, Limited, on the north fork of the Quesnel; B. Boe on Poquette creek; E. A. Bradley on the south side of the south fork of the Quesnel; and G. F. Baird on Antoine creek in the Horsefly section.

Considerable interest has been taken in placer mining both on Rock and Boundary creeks in the Greenwood mining division of the southern mineral survey district where some very favourable looking pay-gravel has been uncovered on the Rock Creek Consolidated Placers ground. Gold was also found in the gravels of McKinney creek (south fork of Rock creek). During the winter many miners continued underground work in this area, washing the development gravels in their tunnels, ground water being sufficient for this purpose. On Boundary creek several crews of men were employed exploring the bench gravels by shaft sinking, trenching and open cuts.

An unusual amount of interest was shown in alluvial mining in the Similkameen division resulting in the recovery of a considerable quantity of gold in small lots; an eight-ounce gold nugget was found on the Tulameen near the mouth of Bear creek. Comparatively large platinum nuggets were also recovered in this district. It is reported that in the Yale district many persons eked out a living on the shallow bars and benches by "sniping" or individual crude hand methods. A large percentage of the gold found in the Fraser river is very fine and the "hidden" values referred to by prospectors are mostly microscopic gold, plus a little platinum. Preliminary tests made by the Department of Mines in Ottawa point to the fact that 95 per cent of this gold is comparatively clean and can be saved by ordinary amalgam-barrel methods.

A small dredge working on the Fraser river in the Ashcroft mining division, is reported to have recovered 45 ounces of gold; the dredge was eventually disabled by capsizing. Considerable work was carried out on the Thompson river about 62 miles west of Kamloops where part of the old river bed was tested by digging cross-cut ditches with a gas shovel; values from 35 cents to \$2.70 per cubic yard were reported by the owners. A new gold fine was reported in 1932 from Fenton creek in the Clinton mining division; coarse, rough edged gold was found in the creek gravels at depths of from 5 to 30 feet. Some new placer gold discoveries were made in the Kamloops division on the streams flowing into Hefley lake from the south and also in Dow creek to the south. Innumerable "snipers" were working along the rivers and creeks in this division with many of them making a living.

Placer mining was active at widely separated points in the west Kootenay, especially in the Big Bend section north of Revelstoke and in the district tributary to Nelson. Clean-ups for the season in the Big Bend section by the French Creek Development Company aggregated \$13,125; other streams actively prospected or worked in the Revelstoke division during 1932 included McCulloch creek, Smith creek and Goldstream. In the Lardeau division individuals and partnerships worked the Lardeau river at several points; the actively prospected areas of the Ainsworth division included the Lardeau river, Howser Pass, Hall creek and Fry creek; at a few properties in the Nelson division mechanical equipment was utilized; on Hall creek a drag line outfit and caterpillar were employed, while a 120 cubic yard capacity Crown machine was in operation on Falls creek.

During the year 172 new placer mining leases were issued in the East Kootenay, including 132 creek leases, 30 bench leases, and 10 dredging leases. Stakings in 1932 covered areas on Fish Lake creek, St. Mary's river, Perry creek, Valley creek, Kootenay river, Wildhorse creek, Boulder creek, Maus creek, Skookumchuck river, Moyie river, Palmer Bar creek and Nigger creek.

The Lower Bridge River Placers Limited, operating on the lower Bridge river in the Lillooet division, completed the installation of its plant and commenced hydraulicking late in the season; on Tyaughton creek in the same division, Tyaughton Creek Placers Limited, installed a hydraulicking plant on its property. It is reported that this company will be in operation early in 1933.

YUKON

The amount of placer gold mined during the year in Yukon on which royalty export tax was paid was 51,039.8 ounces and the royalty collected was \$19,141.96. The major portion of the placer gold recovered was from the Klondike area. The Glacier district was next in importance with an increase in production for the year. The balance of placer gold produced was from the Mayo and Whitehorse districts.

The Klondike River hydro-electric power plant of the Yukon Consolidated Gold Corporation Limited, operated continuously throughout the year; dredge Canadian No. 2 commenced digging on hydraulic lease No. 18 below Bear Creek on May 2nd and ceased October 25th; operating costs were reported at 6.41 cents per cubic yard. Dredge Canadian No. 3 operating on hydraulic lease No. 18 commenced digging June 27th and closed October 21st, costs in this operation were reported at 14.32 cents per cubic yard. Dredge Canadian No. 4 commenced digging on hydraulic lease No. 4 above Bear creek on May 2nd and closed November 15th, costs were estimated at six cents per cubic yard. Dredge New North West No. 1 on upper Dominion creek commenced operations on May 3rd and ceased November 1st, costs were reported at 13.78 cents per cubic yard. Dredge New North West No. 2 on lower Dominion creek started April 27th and closed October 10th with total costs reported at 10.49 cents per cubic yard. The company's hydraulic operations on Crofton and Lovett hills were carried on with water supplied through the Twelve Mile ditch and on the left limit on the Klondike valley between Bear Creek syphon and Thomas Gulch several lines of shafts were sunk by the company in order to test the gravels in that section. This is a departure from the usual drilling operations for testing gravels on this ground. The company spent a very considerable amount in purchasing major dredge replacements which were to be installed in the spring of 1933.

In the Glacier district dredging operations were continued on the Sixty Mile river by the Holbrook Dredging Company. One dredge was operated from June 1st to November 15th. On Miller creek, McDonald, McCormick and Stewart were active in drifting and ground sluicing.

Throughout the whole Yukon an increased interest has been shown in placer mining. Creeks which were abandoned are now claiming attention and in many cases satisfactory results were attained.

Table 31.—Summary Statistics of Alluvial Gold Mining in Canada, 1931 and 1932

	British Columbia	Yukon (a)	British Columbia	Yukon	Quebec and Alberta	Canada	
	1931		1932			1931	1932
Number of firms and individual operators*	105	4	112	3	5	109	120
Time in operation—months.....	6-8	6-8	6-10	6-8	6-8	6-8	6-8
Capital employed..... \$	1,881,891	4,026,110	496,670	6,684,460	125,000	5,908,001	7,396,130
Number of employees.....	165	172	171	186	16	337	373
Salaries and wages paid..... \$	235,924	447,011	178,833	465,343	21,535	682,935	665,711
Fuel and electricity used..... \$	20,906	20,839	3,139	35,122	579	41,745	38,840
Electricity generated for own use. K.W.H.	11,387,391	.....	12,257,230	.....	.....	11,387,391	12,257,230
Crude gold recovered—crude ounce.....	17,176	55,315	20,400	50,466	236	72,491	71,102
Platinum recovered—crude ounce.....	50	.....	59	.....	0-25	50	59
Value of platinum recovered..... \$	1,783	.....	2,372	.....	10	1,783	2,382
Quantity of material handled.....cu. yds.	1,587,271	4,914,638	1,053,677	6,051,256	12,000	6,501,909	7,116,933
Length of ditches.....miles.	127	123	117	123	.....	250	240
Total value of alluvial products..... \$	293,775	932,766	349,172	857,922	3,924	1,226,541	1,211,018

(a) Includes data relating to one property in Quebec.

* In addition to the number shown in the table, there were several other small operators from whom no returns were obtainable.

4. The Auriferous Quartz Mining Industry

This industry includes the mining and milling of ores in which gold is the predominating metal in value, quartz the prevailing gangue and from which the values are usually recovered by various methods of cyanidation or amalgamation. Refractory ores containing lead, copper, arsenic, antimony or other metals are usually concentrated by selective flotation or other methods and the gold bearing concentrates shipped to smelters for further treatment.

The majority of the larger gold mines in Ontario have adopted straight cyanidation, a few of the smaller producers make recoveries only by amalgamation and in some mills a combination of the two methods has been adopted. The recent introduction of flotation methods in the treatment of some of the Northern Ontario gold ores has materially increased efficiency in milling practice. There is, in the ores from the large Ontario mines, an average proportion of 7 ounces of gold and 1 of silver. A greater variety of gold ores is usually mined in British Columbia than in any of the other provinces. As a general rule each ore with its own peculiar mineral characteristics requires its own individual extraction methods. The high-grade gold-silver-lead ores of the Premier mine in British Columbia are concentrated and the products shipped to other plants for smelting and recovery of the precious metals.

In 1932 returns were received from 100 Canadian auriferous quartz mines, 65 of which produced bullion or shipped ores while 35 were engaged only in exploration or development. Producing mines in this group shipped 2,412,829 fine ounces of gold in bullion, while ores shipped from these properties contained 89,498 fine ounces; minor amounts of the precious metal were contained in slags, etc.

Table 32.—Capital Employed in the Auriferous Quartz Mining Industry in Canada, 1931 and 1932

Province	Operating mines	Capital employed as represented by				
		Present value of buildings, fixtures, machinery, tools, equipment, etc.	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	No.	\$	\$	\$	\$	\$
1931						
Nova Scotia.....	4	101,092	700	.....	5	101,797
Quebec.....	15	4,206,174	104,471	14,910	413,434	4,733,989
Ontario.....	30	78,172,868	2,736,434	483,487	12,848,452	94,241,241
Manitoba.....	5	3,688,599	51,069	63,000	116,185	3,918,853
British Columbia.....	15	4,574,325	226,754	235,823	1,895,382	6,932,284
Canada.....	69	90,743,058	3,119,428	797,220	15,273,458	109,933,164
1932						
*Nova Scotia.....	4	154,274	67,500	10,000	1,500	233,274
Quebec.....	32	5,092,383	309,797	3,946	670,358	6,076,484
Ontario.....	31	24,899,269	2,795,355	444,218	17,091,506	45,231,348
Manitoba.....	5	1,746,814	103,112	20,345	136,908	2,007,179
British Columbia.....	28	2,151,099	191,921	163,834	2,112,196	4,619,050
Canada.....	100	34,043,839	3,468,685	642,343	20,012,468	58,167,335

* Contains data for one property in Saskatchewan. In Nova Scotia there are usually a few small operations that are unreported.

Table 33.—Ores Mined and Milled, Crude Bullion Produced and Shipped from the Auriferous Quartz Mines in Canada, by Provinces, 1931 and 1932

	Quebec	Ontario	*Manitoba	British Columbia	Canada
1931					
Number of producing mines.....	4	20	5	13	42
Ore mined..... tons	94,779	5,041,002	55,587	374,058	5,565,426
Ore milled..... tons	81,802	5,025,018	46,934	296,822	5,459,576
Tailings re-treated..... tons	.....	.....	.....	.....	.....
Bullion recovered by amalgamation..... crude oz.	49,051	586	10	4,420	51,067
Bullion recovered by cyanidation..... crude oz.	6,270	2,675,338	23,142	38,130	2,742,880
Bullion shipped..... crude oz.	55,857	2,635,344	56,702	42,571	2,790,474
Content of bullion shipped—Gold..... fine oz.	47,446	2,058,292	26,042	37,513	2,163,293
Silver..... fine oz.	3,167	356,845	3,779	6,843	370,634
Value..... \$	981,655	42,649,757	539,457	769,868	44,949,737
Exchange premium..... \$	55,003	1,784,956	17,580	36,510	1,894,049
Net value of ores, slags and residues sold..... \$	18,754	56,137	1,046	2,233,855	2,309,792
Total net receipts.....	1,055,412	44,490,850	558,083	3,040,233	49,144,578
1932					
Number of producing mines.....	5	26	7	27	65
Ore mined..... tons	125,093	5,541,969	93,954	311,649	6,072,665
Ore milled..... tons	107,990	5,496,731	80,750	238,888	5,924,359
Tailings re-treated..... tons	.....	.....	3,140	.....	3,140
Bullion recovered by amalgamation..... crude oz.	61,751	150,449	2,584	24,170	238,954
Bullion recovered by cyanidation..... crude oz.	9,937	2,878,736	53,516	43,096	2,985,285
Bullion shipped..... crude oz.	72,856	3,028,960	58,602	66,189	3,226,607
Content of bullion shipped—Gold..... fine oz.	63,003	2,254,068	37,912	57,846	2,412,829
Silver..... fine oz.	5,789	426,703	5,220	11,329	449,041
Value..... \$	1,303,940	46,709,290	785,114	1,199,143	49,997,487
Exchange premium..... \$	165,282	6,165,189	100,166	155,029	6,585,666
Net value of ores, slags, and residues sold..... \$	4,278	66,725	1,551	1,990,065	2,062,619
Total net receipts.....	1,473,500	52,941,204	886,831	3,344,237	58,645,772

* Includes data on 2 mines in Nova Scotia in 1931 and for 1 in Nova Scotia and 1 in Saskatchewan in 1932.

Table 34.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1931 and 1932

Item	*Ontario mines shipping		British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
1931					
Number of mines.....	8	3	11	3	25
Tons of ore, etc. shipped.....	1,362	35	53,349	44,507	99,253
Metal content—					
Gold..... oz.	2,560	1,098	37,506	60,821	101,985
Silver..... oz.	1,317	6,432	1,076,289	1,271,079	2,355,117
Copper..... lb.					
Lead..... lb.			20,759	1,337,943	1,358,702
Zinc..... lb.					
Arsenic..... lb.					
Net value..... \$	51,994	23,943	907,279	1,326,576	2,309,792
1932					
Number of mines.....	10	2	21	5	38
Tons of ore, etc. shipped.....	469	30	36,145	53,661	90,305
Metal content—					
Gold..... oz.	2,691	869	17,620	68,318	89,498
Silver..... oz.	9,105	9,296	306,647	1,311,044	1,636,032
Copper..... lb.	398				398
Lead..... lb.			6,558	1,139,748	1,146,306
Zinc..... lb.					
Arsenic..... lb.					
Net value..... \$	52,283	20,271	378,023	1,612,042	2,062,619

* Includes 2 mines in Quebec and 2 in Manitoba in 1931 and 2 in Quebec and 3 in Manitoba in 1932.

Table 35.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada, by Provinces, 1931 and 1932

Province	1931					1932				
	Number of employees				Salaries and wages	Number of employees				Salaries and wages
	On sal- ary	Wage-earners		Total em- ployees		On sal- ary	Wage-earners		Total em- ployees	
		Sur- face	Under- ground	Mill			Sur- face	Under- ground	Mill	
*Nova Scotia.....	1	4	3	.....	8	4	36	18	.....	58
Quebec.....	52	146	147	20	365	92	316	289	24	721
Ontario.....	432	1,894	5,598	611	8,535	463	1,853	6,008	528	8,852
Manitoba.....	13	69	78	15	175	18	70	131	27	246
British Columbia.....	55	159	264	75	553	56	199	254	56	565
Canada.....	553	2,272	6,090	721	9,636	633	2,474	6,700	635	10,442

*In 1932, contains data for one property in Saskatchewan.

(5) The Copper-Gold-Silver Mining Industry

The copper-gold-silver mining industry comprises a group of mines producing ores in which copper is usually the predominating metal in both value and quantity. The precious metals in these ores, especially during periods of depressed base metal prices, are often very deciding factors in the economic working of some mines of this type.

In northwestern Manitoba and in the Rouyn district of Quebec, important ore deposits of copper-gold sulphide ores, some of which contain zinc in commercial quantities, have been successfully developed and mined during recent years.

NEW BRUNSWICK

Work on the Adams Island copper property in Charlotte county was continued throughout the year by the Eastern Mining and Smelting Company. All work was confined to shaft No. 1 at the western end of the island and to an eighty-eight foot cross cut driven southerly from the foot of that shaft; the shaft is now 95 feet deep, some 3,000 tons of ore are reported on the dump.

QUEBEC

The Consolidated Copper and Sulphur Company operated the Eustis mine, Ascot township, continuously during 1932. Both copper and iron sulphide concentrates were produced and shipped, the greater part of these were exported to the United States. It is interesting to note that in 1932 this company made shipments of iron pyrites concentrates to the Canadian paper manufacturing industry.

Noranda Mines Limited, operating the Horne mine in Rouyn township, report that tonnages of ore shipped from the mine to the smelter and concentrator in the year 1932 increased approximately 20 per cent and although very little exploration work was done during the year the ore reserves show a very substantial increase. The tonnages and average grade of ore shipped from the Horne mine to the smelter and concentrator in 1932 were as follows:—

	Tons	Copper	Gold per ton	Silver per ton
		per cent	\$	ounces
Direct smelting sulphide ore.....	515,462	4.18	9.62	0.90
Silicious fluxing ore.....	323,796	1.29	4.08	0.29
Concentrating sulphide ore.....	379,037	2.13	2.92	0.36
Total.....	1,218,295			

From the information obtained in drifting, cross cutting, diamond drilling and inclined raising in the various ore bodies, there is now indicated above the 2,475 foot level the following tonnages of the three classes of ores treated:—

	Tons	Gold per ton	Copper
		\$	per cent
Direct smelting ore.....	5,750,000	3.27	7.6
Concentrating ore.....	15,800,000	4.00	1.16
Silicious fluxing ore.....	900,000	4.17	0.28

During 1931 and 1932 the amount of material treated in the smelter and the resulting production were as follows:—

	Tons of ore, concentrate and refinery slag treated	Pounds of fine copper produced	Gold produced	Silver produced
			ounces	ounces
1931.....	765,544	62,859,355	253,363	558,801
1932.....	918,567	63,013,485	341,350	619,597

Early in the year 1932, owing to the price of copper, operations at the Waite-Ackerman-Montgomery Mines Limited, the controlling share interest of which is held by Noranda Mines Limited, ceased and it is expected this mine will remain closed until copper prices materially increase. At the Aldermac Mine in Boischatel township, some 3,000 tons of ore were mined and milled, resulting in a shipment of iron pyrites concentrates to a paper mill in Eastern Canada. In addition to operations at the producing mines exploratory surface work was conducted on properties located in Rouyn, Cadillac, Dupuy, Dufresnoy, Boischatel and Clericy townships.

ONTARIO

Practically all of the copper produced in Ontario during 1931 and 1932 was derived from the nickel-copper ores of the Sudbury district. The mining of these ores is included in the nickel-copper mining, smelting and refining industry in Canada, data pertaining to which are contained elsewhere in this report. Gold contained in ores mined by the International Nickel Company of Canada, Limited was recovered during 1932 in metallurgical plants operated at Port Colborne and Copper Cliff, Ontario, and Acton, England. Gold sales in 1932 were reported by the company at 23,042 ounces. Falconbridge Nickel Mines Limited, also operating in the Sudbury district, report that the department for concentrating of precious metal slimes in their Norwegian refineries worked regularly during the year shipping concentrated slimes at suitable intervals; the company reported a recovery of both gold and platinum metals for 1932.

MANITOBA

The Flin Flon mine of the Hudson Bay Mining and Smelting Company Limited is the largest producer of copper-gold ores in Manitoba. During 1932 the company mined and milled 1,439,651 tons of ore averaging .085 ounces gold, 1.13 ounces of silver, 1.98 per cent copper and 3.7 per cent zinc, and from this ore produced 82,565 ounces of gold, 933,983 ounces of silver, 42,158,235 pounds of copper and 41,736,600 pounds of zinc. In addition, the company smelted on toll 23,711 tons of custom ores and concentrates. The total tonnage mined underground was gradually increased from 1,305 tons per day, the average daily tonnage at the start of the year, to an average daily tonnage of 1,700 tons at the end of the year. There were mined from underground and delivered to the concentrator during the year, 564,294 tons of ore assaying:—Gold .099 oz.; silver 1.22 oz.; copper 2.39 per cent; zinc 3.7 per cent.

The operation of the open pit was carried on continuously during the year. There were removed from over the ore by power scrapers and pumping, during the spring and summer 116,500 tons of clay which terminated this slusher operation. In addition there were removed by the electric shovels and sent to the waste dumps 264,845 tons of clay, this making a total of 381,345 tons of clay removed during the year. It was found advisable to use deeper holes in blasting both rock and ore and consequently higher working benches were established so that at the present time most of the benches are 50 feet in height instead of the original 20 feet used at the start of operations. At the start of the year there was mined from the open pit a daily tonnage of 1,736 and at the end of the year a daily tonnage of 2,542. There were mined from the open pit and sent to the concentrator during the year 872,931 tons of ore averaging:—Gold .076 oz.; silver 1.05 oz.; copper 1.71 per cent; zinc 3.7 per cent. In addition 7,994 tons were sent direct to the smelter.

The concentrator treated, during 1932, a total of 1,439,651 tons averaging:—Gold .085 oz.; silver 1.13 oz.; copper 1.98 per cent; zinc 3.7 per cent from which were produced 235,265 tons of copper concentrates assaying:—Gold .309 oz.; silver 3.69 oz.; copper 9.99 per cent; zinc 3.50 per cent, and 76,197 tons of zinc concentrates assaying:—Gold .098 oz.; silver 2.06 oz.; copper 1.43 per cent, and zinc 44.5 per cent.

There were treated by the cyanide annex during the year 695,494 tons of sulphide ore tailings from which the following metals were recovered in the form of so-called zinc dust precipitate—gold, 11,526.44 oz.; silver 97,541.45 oz.; and copper 55,249 pounds; this production is included in that given for the blister copper output of the smelter. Blister copper produced from Flin Flon ore and shipped by the smelter contained 82,565 oz. gold.

Operations at the Sherritt Gordon mine continued in 1932 until June 15th when in view of the low price for copper and the poor industrial outlook for the immediate future, it was deemed advisable to close down mining operations; gold-bearing copper concentrates produced during the period of operation were shipped to the Flin Flon smelter; the cost of the copper was maintained at just over six cents while the grade of ore treated came down from 74.7 pounds to 67.8 pounds in the ton.

BRITISH COLUMBIA

In the Nass river mining division Granby Consolidated Mining, Smelting & Power Company Limited, carried on continuous operations at the Hidden Creek and Bonanza mines and consideration was given to employment of a maximum number of men. Milling of about 5,000 tons of ore was maintained at the Hidden Creek mine; the most important development of the year was the cutting of a fine body of ore on the 700 feet level on No. 4 ore body. Trimming of about 275 tons of ore a day was maintained from the Bonanza mine. On the south side of the creek work on the Bonanza ore body has shown its extension to the southwest. Shipments of about 300 tons of high grade gold-copper blister per month were made during the year. The staff of this company deserve great credit for the remarkably low costs of operation.

Encouraging widths of chalcopyrite ore with appreciable gold values in places were uncovered on the Wildcat property in the Kitsault river section; some other properties in this district show favourable results from development work.

The property of the Lasco Development Company Limited, the Venus group, and the adjoining property, the Juneau group, located on Lasqueti island in the Western Mineral Survey District No. 6 have been amalgamated and are now under development by the Pacific Gold Mines Limited. A compressor plant was installed and development work carried on in the Venus tunnel at the beach. The ore is chalcopyrite carrying substantial gold values.

The Britannia Mining and Smelting Company Limited, operating on Howe Sound, suspended all sales of copper early in March owing to the marked decline in the price of the metal and thereafter all mine operations were curtailed; at the end of the year production was on a basis of approximately 10 per cent of capacity. The plants of the company have been maintained at maximum efficiency so that capacity production may be resumed when market conditions warrant increased output. Due to the import duty of 4 cents per pound on copper, included in the U.S. Revenue Law effective June 21, 1932, the copper thereafter produced at Britannia, when sold, must be marketed abroad and arrangements for such disposal of the product were perfected on a basis believed to be satisfactory. In 1932 there were mined and milled 773,508 tons of ore, mainly from the East Bluff deposit where the gold content is slightly higher than in other sections of the mine. Only a portion of the 15,481 tons of iron pyrites produced was disposed of. The British Columbia Department of Mines states that the Britannia has been kept going more from a humanitarian viewpoint than for profitable mining under present market conditions. The Coast Copper Company Limited conducted only road construction during the first four months of the year on their property at Jeune Landing in the Quatsino mining division; the property remained idle during the remainder of 1932.

NORTHWEST TERRITORIES

Northern Aerial Minerals Exploration Limited state that during the 1931 season some trenching was done on the copper deposits of that company located in the Copper Mine River area. In one trench widths are reported from 12 to 15 feet and check sampling gave an average copper content of 47.13 per cent. The showing on "D" group of claims in the same area was trenched and disseminated chalcocite ore body was indicated. This is reported to average 9 per cent copper with a width of 8 feet for at least 1,100 feet in length. A diamond drill was transported to the first-mentioned property late in the 1931 season.

Ventures Limited reported in 1931 that diamond drilling on the Sloan Copper find at Hunter Bay, Great Bear Lake, indicated that an important body of copper ore existed, averaging 8 per cent to 10 per cent copper. No mining of copper-gold ores in the the Northwest Territories was recorded for 1932.

Table 36.—Capital Employed in the Copper-Gold-Silver Mining Industry in Canada, 1931 and 1932

Province	Number of operating mines	Capital employed as represented by				
		Present value of buildings, fixtures, machinery, tools, equipment, etc.	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
1931		\$	\$	\$	\$	\$
Quebec.....	31	4,643,567	124,663	10,000	857,028	5,635,258
Manitoba and Ontario.....	3	12,865,616	665,164	647,455	3,117,114	17,295,349
British Columbia.....	22	13,155,713	331,766	235,438	474,396	14,197,313
Canada.....	56	30,664,896	1,121,593	892,893	4,448,538	37,127,920
1932						
New Brunswick, Manitoba and Saskatchewan	5	5,349,623	927,079	788,828	363,260	7,428,790
Quebec.....	11	1,925,227	67,236	33,303	221,608	2,247,374
British Columbia.....	14	4,436,503	280,115	64,793	335,797	5,117,208
Canada.....	30	11,711,353	1,274,430	886,924	920,665	14,793,372

Table 37.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1931 and 1932

	Quebec and Manitoba	British Columbia	Canada
	tons	tons	tons
1931			
Ore mined.....	2,403,442	3,599,423	6,002,865
Ore milled.....	1,697,188	3,546,194	5,243,382
Copper concentrates produced.....	304,179	164,880	469,059
Pyrite concentrates produced.....	29,149	34,144	63,293
Zinc concentrates produced.....	63,828		63,828
1932			
Ore mined.....	2,903,432	2,549,736	5,453,173
Ore milled.....	2,058,100	2,549,559	4,607,659
Copper concentrates produced.....	346,916	171,693	518,609
Pyrite concentrates produced.....	36,128	35,817	71,945
Zinc concentrates produced.....	76,507		76,507

†Includes 5 tons mined in Saskatchewan.

Table 38.—Shipments from Copper-Gold-Silver* Mines in Canada, 1931 and 1932

Destination	Quantity	Net value	Content as determined by settlement assay				
			Gold	Silver	Copper	Sulphur	Zinc
	Tons	\$	Fine oz.	Fine oz.	Pounds	Tons	Pounds
1931							
12 mines shipped to Canadian smelters—							
Ores.....	1,726,712	9,390,000	309,765	1,522,200	96,789,533		47,835,966
Copper concentrates.....	177,211	3,737,435	54,337	475,920	62,557,732		
Zinc concentrates.....	63,828	430,390	5,808	126,379	1,928,000		35,056,199
4 mines shipped to Foreign smelters—							
Ores.....	55	1,520	58	150	5,345		
Copper concentrates.....	71,015	2,236,631	5,396	164,957	35,012,918		
Pyrite concentrates (a).....	63,293	155,127				31,771	
Zinc concentrates.....							
Total.....	2,102,114	15,951,103	375,364	2,239,606	196,233,528	31,771	82,892,165
1932							
14 mines shipped to Canadian smelters—							
Ores.....	850,451	3,283,720	314,784	564,983	51,905,334		
†Copper concentrates.....	451,117	6,479,044	129,356	1,386,662	110,311,196		
Zinc concentrates.....	76,507	465,348	7,535	157,843	2,181,377		68,258,142
3 mines shipped to Foreign smelters—							
Ores.....	54	3,065	157	28			
Copper concentrates.....	37,558	758,053	8,868	87,346	18,625,044		
Pyrite concentrates (a).....	52,049	164,529				24,829	
Zinc concentrates.....							
Total.....	1,467,736	11,143,759	463,700	2,196,862	183,022,951	24,829	68,258,142

†Contains some metals recovered from cyanide precipitate produced in Manitoba.

*Some of these ores contain selenium.

(a) Contains shipments to Canadian paper mills.

Table 39.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, 1931 and 1932

	1931		1932	
	Number	Salaries and wages	Number	Salaries and wages
		\$		\$
SALARIED EMPLOYEES—				
Total.....	226	561,223	143	350,866
WAGE-EARNERS—				
Surface.....	834		773	
Underground.....	1,768	4,397,094	1,719	3,419,761
Mill.....	523		441	
Total.....	3,125	4,397,094	2,933	3,419,761
Grand total.....	3,351	4,958,317	3,076	3,770,627

Table 40.—Production of New Gold in Canada, by Provinces and Sources, 1931 and 1932

(Gold at \$20·671834 per fine ounce)

	1931		1932	
	Fine ounces	Value	Fine ounces	Value
		\$		\$
NOVA SCOTIA—				
In gold bullion	460	9,509	964	19,928
Exchange equalization.....		411		2,706
QUEBEC—				
In blister copper, in ores shipped and in gold bullion.....	300,075	6,203,101	401,105	8,291,576
Exchange equalization.....		267,974		1,125,996
ONTARIO—				
*Porcupine area—In gold bullion.....	962,252	19,891,513	1,036,295	21,422,118
*Kirkland Lake—In gold bullion.....	1,051,377	21,733,891	1,143,181	23,631,648
Miscellaneous, including Northwestern Ontario and Sudbury area..	72,185	1,492,196	100,629	2,080,186
Total.....	2,085,814	43,117,600	2,280,105	47,133,952
Exchange equalization.....		1,862,680		6,400,791
MANITOBA				
In gold bullion, ores shipped and in blister copper.....	102,969	2,128,558	122,507	2,532,444
Exchange equalization.....		91,954		343,906
SASKATCHEWAN—				
In ores shipped to Canadian smelters and crude gold to Royal Canadian Mint.....			11	227
Exchange equalization.....				31
ALBERTA—				
In alluvial gold	195	4,031	83	1,716
Exchange equalization.....		174		233
BRITISH COLUMBIA—				
In alluvial gold.....	13,741	284,052	16,320	337,364
In gold bullion.....	37,233	769,674	57,846	1,195,783
In blister copper.....	26,364	544,992	19,013	393,034
In base bullion and in matte and ores exported.....	82,731	1,710,202	105,825	2,187,597
Total.....	160,069	3,308,920	199,004	4,113,778
Exchange equalization.....		142,945		558,651
YUKON—				
In alluvial gold.....	44,061	910,822	40,373	834,584
In ores exported.....	249	5,147	235	4,858
Total.....	44,310	915,969	40,608	839,442
Exchange equalization.....		39,570		113,996
Total for Canada	2,693,892	55,687,688	3,044,387	62,933,063
Estimated exchange equalization on gold produced.....		2,405,708		8,546,310

*Includes small amounts of gold contained in slags, etc.

Table 41.—Production of Gold in Canada, 1923-1932

Year	Fine ounces*	Value	Year	Fine ounces*	Value
		\$			\$
1923.....	1,233,341	25,495,421	1928.....	1,890,592	39,082,005
1924.....	1,525,382	31,532,443	1929.....	1,928,308	39,861,663
1925.....	1,735,735	35,880,826	1930.....	2,102,068	43,453,601
1926.....	1,754,228	36,263,110	1931.....	2,693,892	55,687,688
1927.....	1,852,785	38,300,464	1932.....	3,044,387	62,933,063

*Calculated from the value \$1=0·048375 ounces.

Note.—For years 1858 to 1922, see previous reports.

Refined Gold.—Fine gold was produced during 1932 at refineries operated by the Royal Mint at Ottawa; by the Hollinger Consolidated Gold Mines Ltd., Timmins, Ont.; by the Ontario Refining Company at Copper Cliff, Ontario; by the Canadian Copper Refiners Ltd., Montreal East, Quebec, and by the Consolidated Mining and Smelting Company at Trail, British Columbia.

Refined gold produced in the plants at Copper Cliff, Ontario, and Montreal East, Quebec, is produced chiefly from the precious metal residues recovered in the refining of blister copper. Refined gold produced at Trail comes principally from the extractions of the metal in treating custom ore. Small quantities of imported gold ores are also treated at the Trail smelter.

Fine gold contained in crude bullion or rough metal received at the Royal Canadian Mint, Ottawa, during 1932 amounted to 2,829,521 ounces as compared with 1,721,236 ounces in 1931 and 862,075 ounces in 1930. The Mint in 1932 delivered to the Currency Branch, Department of Finance, 2,845,377 fine ounces and to manufacturers and others, 27,844 fine ounces as against 1,701,666 fine ounces and 26,391 fine ounces respectively, in 1931.

Table 42.—Receipts at the Royal Mint, Ottawa, Canada, by Sources, 1931 and 1932

Source	1931			1932		
	Gross weight	Precious metal content		Gross weight	Precious metal content	
		Fine gold	Fine silver		Fine gold	Fine silver
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
Nova Scotia.....	564	460	48	1,145	964	47
New Brunswick.....						
Quebec.....	137,569	129,451	3,643	482,354	471,198	5,560
Ontario.....	1,762,481	1,441,662	171,408	2,865,271	2,248,106	300,927
Manitoba.....	56,938	25,901	3,781	56,449	34,470	4,809
Saskatchewan.....	11	9	1	4	3	1
Alberta.....	48	41	5	124	92	9
British Columbia including Dominion of Canada Assay Office, Vancouver.....	116,787	94,145	16,986	84,293	62,408	13,623
Yukon.....	10	8	2	321	255	62
Jewellery and scrap, various sources.....	47,246	29,489	4,344	30,293	12,015	3,831
Foreign.....	78	70	0	14	10	2
Total.....	2,121,732	1,721,236	200,218	3,520,268	2,829,521	328,671

Table 43.—Quantity and Value of Gold produced in Canada, by Provinces, 1923-1932

(For the years 1862 to 1922, see Mineral Production of Canada, 1928)

Year	Nova Scotia		Quebec		Ontario		Manitoba	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1923.....	655	13,540	667	13,788	971,704	20,086,904	31	641
1924.....	1,047	21,643	883	18,253	1,241,728	25,668,795	1,180	24,393
1925.....	1,626	33,612	1,602	33,116	1,461,039	30,202,357	4,424	91,452
1926.....	1,678	34,687	3,680	76,072	1,497,215	30,950,180	188	3,886
1927.....	3,151	65,137	8,331	172,217	1,627,050	33,634,108	182	3,762
1928.....	1,290	26,667	60,006	1,240,434	1,578,434	32,629,126	19,813	409,571
1929.....	2,687	55,545	90,798	1,876,961	1,622,267	33,535,234	22,455	464,186
1930.....	1,272	26,295	141,747	2,930,170	1,736,012	35,886,552	23,189	479,359
1931.....	460	9,509	300,075	6,203,101	2,085,814	43,117,600	102,969	2,128,558
1932.....	964	19,928	401,105	8,291,576	2,280,105	47,133,952	122,507	2,532,444

Year	Saskatchewan		Alberta		British Columbia		Yukon	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1923.....					200,140	4,137,261	60,144	1,243,287
1924.....					245,719	5,079,462	34,825	719,897
1925.....					219,227	4,531,824	47,817	988,465
1926.....					225,866	4,669,065	25,601	529,220
1927.....			42	868	183,094	3,784,889	30,935	639,483
1928.....			68	1,406	196,617	4,064,434	34,364	710,367
1929.....			5	103	154,204	3,187,680	35,892	741,954
1930.....					164,331	3,397,023	35,517	734,202
1931.....			195	4,031	160,069	3,308,920	44,310	915,969
1932.....	11	227	83	1,716	199,004	4,113,778	40,608	839,442

Table 43a.—Total Gold Production in Ontario*

Year	Total production	Porcupine belt		Kirkland Lake belt	
	\$	\$	per cent	\$	per cent
1866-1891.....	†190,258				
1892-1909.....	‡2,509,492				
1910.....	68,498	35,539	51.8		
1911.....	42,637	15,437	36.2		
1912.....	2,114,086	1,730,628	81.8		
1913.....	4,558,518	4,294,113	94.1	86,316	1.9
1914.....	5,544,979	5,206,006	93.8	114,154	2.0
1915.....	8,501,391	7,462,111	88.6	551,069	6.5
1916.....	10,339,259	9,391,408	90.8	702,761	6.8
1917.....	8,698,735	8,229,744	94.5	404,346	4.6
1918.....	8,502,480	7,767,907	91.4	632,007	7.4
1919.....	10,451,709	9,941,803	95.1	486,809	4.7
1920.....	11,686,043	10,597,572	90.7	1,033,478	8.8
1921.....	14,692,357	13,103,526	89.5	1,524,851	10.4
1922.....	20,579,569	18,374,658	89.3	2,159,581	10.5
1923.....	20,136,287	17,313,115	85.9	2,719,939	13.5
1924.....	25,669,303	22,135,534	86.2	3,446,632	13.4
1925.....	30,206,432	24,733,120	81.8	5,385,256	17.8
1926.....	30,950,753	23,680,670	76.5	7,174,083	23.2
1927.....	33,627,040	23,851,857	70.9	9,674,114	28.7
1928.....	32,629,111	20,246,319	62.0	12,233,524	37.5
1929.....	33,535,226	19,281,286	57.6	14,046,596	41.8
1930.....	35,886,558	17,758,842	49.6	17,172,770	47.9
1931.....	43,117,615	19,891,521	46.2	21,734,729	50.4
1932.....	47,284,621	21,422,117	45.2	23,782,313	50.3
Total to end of 1932.....	441,522,957	306,464,833	69.4	125,065,328	28.3

*Supplied by Ontario Department of Mines.

†Estimated.

‡Maximum yearly output was \$424,568 in 1899.

From 1898 to March 31, 1933, royalties to the extent of \$5,016,223 were collected on the gold production of the Yukon. The yearly amounts collected, as well as the annual production of gold as ascertained by the Department of the Interior, are shown below. The difference between these figures and those shown in the table of annual production, which are based on mint receipts of Yukon gold is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at \$15 per ounce, (2) the probability that, in the earlier years of royalty collection, considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small production from lode mines.

Table 44.—Gold Production in the Yukon and the Royalty Collected, 1923-1933

(Supplied by the Mining Lands Branch of the Department of the Interior.)

(For years 1898 to 1922 see 1928 report on the Mineral Production of Canada)

Fiscal year	Total gold production	Total exemption	Royalty collected on	Royalty paid
	\$	\$	\$	\$
Ending March, 1923.....	1,032,762		1,032,762	25,819.04
Ending March, 1924.....	1,136,368		1,136,368	28,409.23
Ending March, 1925.....	625,459		625,459	15,636.48
Ending March, 1926.... Since 1902, the Dominion Government has..	879,819		879,819	21,995.50
Ending March, 1927.... collected a royalty of 2½ per cent on all gold..	497,504		497,504	12,437.64
Ending March, 1928.... produced; the Government for royalty pur..	568,221		568,221	14,205.55
Ending March, 1929.... poses, places a nominal value of \$15 on each..	654,672		654,672	16,366.79
Ending March, 1930.... crude ounces recovered.	657,537		657,537	16,438.42
Ending March, 1931.....	654,925		654,925	16,372.41
Ending March, 1932.....	812,285		812,285	20,307.36
Ending March, 1933.....	765,597		765,597	19,140.02

Table 45.—Imports into Canada and Exports of Gold, 1931 and 1932

Items	1931	1932
	\$	\$
IMPORTS—		
Coins and bullion—		
Coins, British, Canadian and foreign gold coins.....	1,655,509	854,908
Gold bullion in bars, blocks, ingots, drops, sheets or plates, unmanufactured.....	398,292	264,863
Total.....	2,053,801	1,119,771
Gold, other—		
Bullion or gold fringe.....	9,506	6,371
Manufactures of gold and silver—		
Leaf.....	76,431	63,203
Sweepings.....	35	70
Manufactures, n.o.p.....	31,878	19,189
Electroplated ware.....	575,234	337,721
Medals of gold, silver or copper and other metallic articles, actually bestowed as trophies or prizes, and received and accepted as honorary distinctions, and cups or other metallic prizes won in bona fide competitions.....	21,251	19,788
Total.....	714,335	446,342
EXPORTS—		
Coin and bullion—		
Gold coin—		
Canadian.....	920	500
Foreign.....	37,439,464	9,424,691
Gold bullion—		
Canadian.....	31,887,899	51,395,700
Foreign.....		4,520
Total—Canadian coin and bullion.....	31,888,819	51,396,200
Total—Foreign coin and bullion.....	37,439,464	9,429,211
Grand Total coin and fine gold bullion.....	69,328,283	60,825,411
Gold-bearing quartz, dust, nuggets and crude bullion obtained direct from mining operations....	17,682,563	3,925,729
Jewellers' sweepings (gold, silver and platinum).....	234,276	290,095
Total.....	17,916,839	4,215,824

Table 46.—Comparative Figures of Gold Production, for the World, South Africa, the United States and Canada, 1913-1932

Year	*World's output	†Union of South Africa output	*United States' output	Canada's output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1913.....	22,249,596	8,798,713	4,299,784	802,973
1914.....	21,240,416	8,396,068	4,572,976	773,178
1915.....	22,760,788	9,096,411	4,887,604	918,056
1916.....	22,107,669	9,296,964	4,479,057	930,492
1917.....	20,289,546	9,018,389	4,051,440	738,831
1918.....	18,556,920	8,418,379	3,320,784	699,681
1919.....	17,695,037	8,331,651	2,918,628	766,764
1920.....	16,205,029	8,158,455	2,476,166	765,007
1921.....	15,974,962	8,128,710	2,422,006	926,329
1922.....	15,451,945	7,009,858	2,289,235	1,263,364
1923.....	17,790,597	9,149,073	2,426,495	1,233,341
1924.....	19,031,001	9,575,040	2,446,338	1,525,382
1925.....	19,025,942	9,597,592	2,319,920	1,735,735
1926.....	19,349,118	9,954,762	2,238,616	1,754,228
1927.....	19,397,757	10,122,491	2,117,253	1,852,785
1928.....	19,755,622	10,354,264	2,144,720	1,890,592
1929.....	19,500,152	10,412,326	2,056,629	1,928,308
1930.....	20,900,000	10,716,351	2,138,723	2,102,068
1931.....	22,400,000	10,877,777	2,224,729	2,693,892
1932.....	24,000,000	11,558,532	2,291,479	3,044,387

*Figures taken from annual report of the Director of the Mint, Washington, from 1913 to 1929. From 1930 figures are supplied by *Imperial Institute*.

†From the *Imperial Institute publications*.

NOTE.—For complete historical table of Canadian Gold Production, see 1928 Annual Report on Mineral Production of Canada.

Table 47.—World Production of Gold Ore, 1930-1932

(In terms of metal)

(Supplied by Imperial Institute)

Country	1930	1931	1932	Country	1930	1931	1932
	Fine ounces	Fine ounces	Fine ounces		Fine ounces	Fine ounces	Fine ounces
BRITISH EMPIRE—				FOREIGN COUNTRIES—Con.			
United Kingdom.....			6	U.S.S.R. (Russia) (f)....	1,434,000	1,711,000	1,990,000
Anglo-Egyptian Sudan				Hungary.....	(a)	(a)	2,688
(exports of bullion).....	940	940	700	Sweden.....	33,790	61,632	(a)
Bechuanaland Protectorate.....	2,274	1,302	2,247	Belgian Congo.....	210,245	237,887	281,707
Gold Coast.....	240,899	261,651	(c) 280,000	Egypt.....	542		16
Kenya.....	1,789	3,169	10,987	French Equatorial Africa.....	2,829	8,745	14,532
Nigeria.....	260	699	2,701	French West Africa.....	9,227	33,147	(a)
Northern Rhodesia.....	7,511	9,364	6,349	Madagascar.....	7,234	8,584	(a)
Southern Rhodesia.....	547,630	532,111	574,135	Mozambique.....	176	538	2,665
Sierra Leone (crude gold).....	720	5,700	12,099	Mexico.....	668,977	623,003	584,198
South West Africa.....	222	570	890	United States (b).....	2,138,723	2,224,729	2,291,479
Swaziland.....			365	Costa Rica (e).....	4,780	2,687	8,088
Tanganyika Territory.....	11,072	12,728	25,687	Guatemala (e).....	14,307	13,869	9,531
Union of South Africa.....	10,716,351	10,877,777	11,558,532	Honduras.....	13,498	15,835	(e) 13,474
Canada.....	2,102,068	2,693,892	3,051,676	Nicaragua (e).....	13,323	14,385	14,045
Newfoundland.....	8,345	13,221	17,821	Panama.....	(e) 121	(d) 5,500	(e) 3,290
British Guiana.....	6,364	10,183	13,926	Salvador (e).....			927
Federated Malay States.....	29,597	27,021	27,159	Argentina (estimated).....	1,000	1,000	1,000
Unfederated Malay States.....			265	Bolivia.....		26	218
India.....	329,200	330,400	329,600	Brazil.....	143,775	126,440	(a)
Sarawak (exports).....	3,000	9,000	8,000	Chile.....	17,333	16,718	38,096
Australia.....	466,593	595,123	710,915	Colombia.....	158,732	194,274	248,249
New Guinea (years ended June 30).....	30,000	30,000	(a)	Dutch Guiana (crude gold).....	4,758	4,597	8,970
New Zealand.....	(c) 129,070	130,049	166,354	Ecuador (estimated).....	71,500	61,200	(a)
Papua (years ended June 30).....	2,367	4,305	9,904	French Guiana.....	43,949	47,486	(a)
Uganda.....		71	586	Peru.....	71,084	79,410	(a)
Total.....	14,600,000	15,500,000	16,600,000	Venezuela.....	58,729	42,310	91,534
				China.....	126,000	144,000	(a)
FOREIGN COUNTRIES—				Formosa.....	64,900	(d) 65,000	65,700
Czechoslovakia.....	9,418	5,743	(a)	French Indo-China.....	370	225	(a)
France.....	42,985	60,800	(a)	Japan.....	387,983	430,238	396,551
Germany.....	6,067	4,128	2,205	Korea (estimated).....	180,000	240,000	(a)
Italy.....	2,942	2,479	3,876	Netherlands East Indies.....	110,447	100,092	77,959
Jugoslavia.....	23,000	30,000	(a)	Philippine Islands.....	179,220	182,153	229,749
Roumania.....	85,905	88,123	118,000	Turkey.....	(a)	220	(a)
				Total.....	6,300,000	6,900,000	7,400,000
				World's Total.....	20,900,000	22,400,000	24,000,000

(a) Information not available.

(b) Amount recovered.

(c) Gold content of exports, excluding jewellers' sweepings.

(d) Estimated.

(e) Imports into the United States from the country indicated.

(f) Official statistics are not available, the Russian authorities having closely censored all published material concerning gold. The above figures have been calculated on percentages of previous years' production published in the Russian press.

CHAPTER THREE

THE SILVER MINING INDUSTRY IN CANADA

Including the Silver-Cobalt Mining Industry, the Silver-Lead-Zinc Mining Industry, and Commodity Statistics Tables on Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review.
2. The Silver-Cobalt Mining Industry.
3. The Silver-Lead-Zinc Mining Industry.
4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc.

1. General Review

(a) **Definition of the Industry.**—Silver mining is not a distinct industry in Canada, as silver is found, as an ore, usually in association with those of other commercially valuable metals; with lead and zinc, as in many of the western mines; with the cobalt and nickel arsenides of northern Ontario; with radium and uranium at Great Bear Lake, N.W.T.; and in copper and other metalliferous ore deposits. Silver is nearly always found alloyed or associated with both alluvial and lode golds from which it is recovered in the refining of the crude gold bullion. This precious metal is, therefore, a rather common constituent in many of our mineral deposits, especially in those of the non-ferrous ores, and its value as a mine product is sometimes a deciding factor in the economical working of an ore body. It is the paramount value in the rich native silver-cobalt ores of Ontario, while in the silver-lead-zinc industry it is usually recovered as an important by-product. The mining and smelting of argentiferous lead and zinc ores are very important industries, especially in British Columbia, and the silver recovered from this type of ore is a distinct contribution to the mineral production of Canada. It is therefore realized that the mining and metallurgy of silver bearing ores are closely interwoven with those of other important metals principally lead and zinc and in order to make a comprehensive survey of the Canadian silver production it is imperative to consider its various sources of origin.

(b) **Historical.**—History pertaining to early Canadian silver and lead mining is meagre. We find in Cape Breton, evidence of early colonial efforts to mine galena ores, and from the records of the French regime we find mention by Champlain of argentiferous galena on the east shore of Lake Temiskaming, this deposit being later worked under the name of the Wright mine. It is stated that early last century small shipments of galena ore were made to Europe from deposits on the east shore of Hudson's Bay. In Ontario, silver-bearing veins were found as early as 1846 in the vicinity of Thunder Bay on Lake Superior. It was not until 1866 that Thomas McFarlane discovered in this district high grade silver ore in important commercial quantities. This, a sensational "find", was made on a small rocky island not more than 90 feet in diameter and located but a short distance off Thunder Cape. The property, later known as the Silver Islet mine, produced until 1884, the year of its abandonment, approximately \$3,250,000 in silver. Some of the other producing mines of this period in the Port Arthur district were the Silver Mountain, Beaver, Rabbit Mountain and Poreupine.

Construction of the Temiskaming and Northern Ontario railroad during 1903 was highly instrumental in the finding of one of the world's richest silver areas. Grading operations along what was then known as Long Lake in northern Ontario revealed veins possessing a mixture of unfamiliar minerals, leaves and wires of a white sectile metal were found on the surfaces of pinkish coated (erythrite) vein fillings. It was only after specimens of these "queer rocks" were sent south for identification and the announcement officially made of the discovery of important native silver and cobalt ores that the country became keenly interested. Silver discoveries and mine development in the South Lorrain and Gowganda areas followed shortly after the original finds at Cobalt and represent the results attained in the widened sphere of the prospecting activity subsequent to the first "boom" in Coleman township.

History is silent as to any important silver production or discoveries in the Prairie Provinces. Small amounts have been recorded as coming from either Manitoba or Alberta and chiefly represent the metal recovered in the refining of crude gold bullion. The dawn, or perhaps more aptly put, the false dawn of the silver-lead mining industry in British Columbia reaches back into the early decades of placer prospecting. The gravel miners penetrating the unexplored upper waters of the auriferous streams eventually encountered widespread evidence of metalliferous deposits. Rich float found in the valley bottoms was sometimes traced up the mountain sides to its source of origin, resulting in the discovery of potential mines. Early development and exploration were greatly delayed by lack of railroad facilities and it was not until late in the eighties that any appreciable production was registered. Small shipments aggregating \$37,925 were made in 1887 from various camps in the Kootenay district. It may be of interest, to note here, that the Monarch mine at Field, discovered in 1884, was a small shipper during 1887 and after 45 years of intermittent operation was reopened under sound financing in 1930 and again commenced shipping silver-lead-zinc ores under modern and more efficient mining methods. Active operations in the Ainsworth camp date from about 1888 and those in the Sandon-Silverton areas from about 1892. The discoveries of the North Star, Saint-Eugène and famous Sullivan deposits were made in East Kootenay during 1892 and 1893.

In 1930 high grade silver-radium ores were discovered at Great Bear Lake, Northwest Territories, these have been actively developed and some relatively small shipments of ore made to metallurgical plants.

Gold was discovered in the Yukon river as early as 1869 and we find, in succeeding years, a synchronous silver production which originated in the alluvial recoveries of the former crude metal. These silver values mounted to impressive figures during the height of the Klondike placer operations. Some argentiferous lode discoveries were made in the Yukon during 1899, but there appears to have been little, if any, production therefrom until 1910, in which year an output of 37,418 ounces of vein silver were recorded. In July, 1919, L. Beauvet made the first outstanding discovery of valuable silver-lead ores in commercial quantities. This find occurred at Keno Hill, 40 miles northwest of the town of Mayo. Ore shipments from these deposits commenced during the winter of 1920-1921. It was during the latter year that the rich Sadie-Friendship vein was found. All ores and concentrates from this area are shipped to outside plants for smelting.

(c) Sources of Silver, Lead, Zinc, Cobalt and Arsenic.—Statistics on the production of silver from Canadian ores include (a) silver contained in silver and gold bullion produced, (b) silver contained in blister copper or lead bullion made, and (c) silver estimated as recoverable from ores of all kinds exported for treatment in foreign smelters.

Figures on lead for 1932 include lead contained in base bullion made at the Trail smelter and lead estimated as recoverable from ores exported from mines in the Yukon and British Columbia. Small quantities of lead, contained in ores and silver-lead-bismuth bullion, recovered by the smelters treating cobalt ores are also included.

Canada's 1932 zinc output was in the form of refined metal produced by the Consolidated Mining and Smelting Company at Trail, B.C., and the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba.

For the past two decades the ores of the Cobalt district of Ontario have been the main source of the world's supply of cobalt, but since 1926, owing to the production of cobalt by the Union Minière du Haut Katanga, from Central African copper-bearing ores, Canada's production was reduced to less than half of the world's output.

Arsenic is produced in Canada from the cobalt-silver-nickel-arsenic ores of the Cobalt district by the smelter of the Deloro Smelting and Refining Company, Limited, at Deloro, Ontario.

(d) Importance of these Metals.—Among the metals produced in Canada during 1932, silver held fourth place, lead fifth and zinc sixth in point of value. Canada ranked third in 1932 as a silver producing country; fourth among those producing lead and third in smelter output of zinc. The Belgian Congo and Canada are the two greatest cobalt producing countries,

the production from the former has, during recent years, considerably surpassed that of the Dominion. From 1904 to 1910 the Canadian cobalt production figures represent an estimate of the cobalt content of the ores shipped from the mines. From 1911 until the present time cobalt production is computed by adding the cobalt metal and the cobalt content of all cobalt oxides and salts manufactured and sold by the Ontario smelters to the cobalt paid for in ores and residues exported for treatment in foreign smelters. Prevailing low prices and an instability of demand have prevented any expansion in the production of arsenic in Canada during recent years.

2. The Silver-Cobalt Mining Industry

Only mining and milling are considered in this chapter. Smelting of the cobalt ores, in so far as the Canadian operations are concerned, is treated in the chapter on "The Non-Ferrous Smelting and Refining Industry."

Following the production derived from Silver Islet and other properties of the Port Arthur district, comparatively little silver was produced in Ontario until the discovery in 1903 of the sensationally rich ores of the Cobalt area. From 1904, when the output of silver was over 3,000,000 ounces, the production increased rapidly until the peak was reached in 1910. In this year Ontario produced 30,366,366 ounces of silver, two years later production declined to 29,000,000 ounces and thereafter followed a generally downward trend until 1921 when less than 10,000,000 ounces were reported. Since 1921 the annual volume of production has fluctuated to some extent, and in 1932 the provincial production amounted to 6,335,788 ounces as compared with 7,438,951 ounces in 1931. Silver recovered as a by-product in the treatment of gold, copper-gold and copper-nickel ores is of increasing importance in offsetting the decline in the recovery of this metal from arsenical-cobalt ores.

Ontario is the only province producing cobalt and refined arsenic. The ores of some of the older mines in the Cobalt area have either been exhausted or seriously depleted and it is only by the intensive and efficient exploration and mining of a comparatively few properties in Gowganda, South Lorrain and the Cobalt camp proper that silver production has remained fairly constant.

The mining of silver-cobalt-arsenic ores in Canada is confined to Northern Ontario. In 1932 extraction of ores of this type showed a decline of 65 per cent from the previous year while the tonnage treated was 30 per cent less. The value of bullion, ores, concentrates and residues sold totalled \$1,735,708, a decrease of 10 per cent as compared with 1931.

The greater part of the 1932 silver output was recovered from ores mined at the O'Brien mine, Cobalt; Miller Lake O'Brien mine, Gowganda; and the properties of the Mining Corporation of Canada. Smaller quantities of silver were produced from ores shipped from the Beaver, Kerr Lake, Temiskaming, McKinley-Darragh-Savage, Hudson Bay, Nipissing, Mann, Right-Of-Way, Aladdin Cobalt, and Foster mines.

Nipissing Mines Co. Ltd., discontinued mining operations at the Nipissing mine about March 1, 1932. The company reported that although certain unimportant silver ore remained there was no incentive for continuing further detailed exploration unless silver prices increased very materially. The Mining Corporation of Canada, Ltd., produced 1,177,791 ounces of silver in 1932. At the beginning of the year the bulk of the remaining silver ore at Cobalt was contained in old stope backs in proximity to the bottom of Cobalt Lake, such ore being overlain with tailings, an opening was blasted through from the underground workings and 400,000 tons of the overlying tailings flowed into the worked out sections of the mine. This permitted the removal of all available tonnage of ore and by the end of the year the long productive record of the Corporation at Cobalt came to an end. The properties of the Corporation in South Lorrain were idle throughout the year and will remain so until silver and cobalt prices justify their re-opening and further exploration. Both the Miller Lake O'Brien and O'Brien mine at Cobalt were in continuous operation throughout 1932. It is interesting to note that a shipment of cobalt ores was made by Kenora Prospectors and Miners, Ltd., from a property located at Werner Lake in the Kenora district of Ontario.

Table 48.—Statistics of Silver-Cobalt Mine and Mill Operations in Canada, 1931 and 1932

	Unit of measure	1931	1932
Number of mines in operation.....		26	20
Ore mined.....	Tons	200,729	70,442
Ores treated.....	Tons	97,747	68,363
Tailings treated.....	Tons		23
Concentrates produced.....	Tons	6,535	1,514
Quantity of material cyanided.....	Tons	39,173	4,567
Bullion recovered.....	Fine ounces	1,025,015	120,777
Bullion sold.....	Fine ounces	201,662	
Net value of bullion, ore, concentrates and residues sold.....	\$	1,925,593	1,735,708

Table 49.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1931 and 1932

	1931	1932
Capital employed as represented by:—	\$	\$
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented.....)	4,784,260	863,296
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	160,354	174,353
(c) Inventory value of finished products on hand.....	713,606	314,038
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	3,694,300	1,654,185
Total.....	9,352,520	3,005,872

Table 50.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1931 and 1932

	1931		1932	
	Number	Salaries and wages	Number	Salaries and wages
SALARIED EMPLOYEES—		\$		\$
Total.....	54	147,195	34	107,850
WAGE-EARNERS—				
Surface.....	195		109	
Underground.....	439	1,002,494	170	443,405
Mill.....	98		56	
Total.....	732	1,002,494	335	443,405
Grand Total.....	786	1,149,689	369	551,255

3. The Silver-Lead-Zinc Mining Industry

CANADA

Silver-lead-zinc ores are widely distributed in Canada. Deposits containing these metals have been either investigated or developed in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, the Yukon, and the Northwest Territories. The mining and metallurgical treatment of this type of ore is largely confined to British Columbia where the growth of this particular branch of the mining industry is closely associated with the successful development and treatment of the Sullivan mine ores by the Consolidated Mining and Smelting Company of Canada.

QUEBEC

Silver-lead-zinc ores were mined from 1910 to 1929 at the Tetreault Mine, Notre Dame des Anges; during the latter year 29,798 tons of flotation concentrates were shipped from this property to foreign smelters. Considerable exploratory work was conducted on an extensive system of lead-zinc veins in Lemieux township, Gaspé. There was no production of lead or zinc in the province since 1930.

ONTARIO

Lead and zinc mineralization is fairly common in certain sections of Ontario. Several years ago lead ores were mined and smelted in Frontenac and Hastings counties. During recent years the greater part of the Ontario lead production came from the Kingdon mine at Galetta. All of these deposits in eastern Ontario possess more or less common characteristics; veins are usually in or associated with crystalline limestones of the Grenville series and the vein matter generally consists of calcite, galena, and zinc blende. A distinctly different type of lead deposit was developed at the Errington mine in the Sudbury field where ore deposition occurs in a major fault zone passing through slates and tuffs of pre-Cambrian age. The crushed zone is, in sections, several hundred feet wide; development indicates that the ore occurs in a number of separate and often parallel shoots. Ore consists of quartz, lead, zinc and copper sulphides, carbonate, rock inclusions and massive iron pyrites; the last mineral has been replaced, in part, by zinc blende, galena and copper pyrites. No lead mines were operated in Ontario during 1932.

MANITOBA

Silver production in Manitoba during 1932 amounted to 1,036,497 fine ounces valued at \$328,275. This was contained in blister copper made at the Flin Flon smelter and in crude gold bullion produced from auriferous quartz ores. Copper deposits were developed during the war and from 1918 to 1920 shipments of copper ore containing silver were made to Trail, B.C., in those three years output from this source amounted to about 50,000 ounces. Following this and owing largely to the drop in price of copper, combined with high freight rates, there were practically no shipments of copper ores for several years. In 1930 the Hudson Bay Mining and Smelting Company commenced the production of blister copper and refined zinc at their new metallurgical plants at Flin Flon, these plants were in continuous operation throughout 1931 and 1932.

BRITISH COLUMBIA

In British Columbia the miners of ores in which lead and zinc are the chief economic constituents continued to feel the effects of abnormally low base metal prices. This was especially pronounced in the case of the smaller operators. The Consolidated Mining and Smelting Company conducted mining and smelting operations in a remarkably successful manner notwithstanding the extremely adverse financial and industrial conditions existing throughout the world in 1932. This company, one of the largest producers of lead and zinc in the world, reports that its position is sound and that operating mines are developed well ahead of current requirements and insure an adequate supply of ore for many years. The record 1931 costs at the Sullivan mine were substantially reduced and the grade of ore mined was slightly higher in lead, zinc and silver. The tonnage, however, was down about 10 per cent. The total tonnage produced at the

mine in 1932 amounted to 1,447,448 tons comprising 6,403 tons of crude ore shipped to Tadanac and 1,441,045 tons of lead-zinc ore to the concentrator at Kimberley, being 173,695 tons less than in 1931. The average cost per ton of ore delivered to the concentrator was further reduced 14.3 per cent and the milling cost 15.8 per cent with a resultant reduction in the cost per pound of metal of nearly 23 per cent. In the matter of ore production, it might be of interest to note that the Sullivan mine has produced to December 31, 1932—55,184,466 ounces of silver, 3,192,306,997 pounds of lead, and 2,522,946,412 pounds of zinc. The company states that Empire preference, effective as from the 1st of March, 1932, materially increased the sale and distribution of their lead and zinc in the United Kingdom.

In the Atlin Mining Division energetic exploration of the Atlin-Ruffner property was continued to about the end of July at which time it was examined by engineers representing European interests. In the Portland Canal and Alice Arm areas, many prospectors owning copper and silver-lead properties carried out more constructive and intelligent work on their showings than perhaps in any other period in recent years. Important new discoveries of silver ores have been made in the American Creek area of the Portland Canal Division and in the Kitsault Valley of the Alice Arm section.

During the year the Premier mine produced 221,718 tons of ore with an average assay content of 0.36 ounces gold and 8.3 ounces of silver. In 1932 the company located and developed 123,562 tons of new ore and produced 1,713,037 ounces of silver as compared with 1,718,376 ounces in 1931 and 2,760,787 ounces in 1930. The Prosperity and Porter Idaho mines owned by the Premier Gold Mining Company have remained inactive since April, 1931. Shipments of high grade silver ore were made from the Silverado in the Marmot river section. In the same area extensive tunnelling, stripping and open-cutting by the Argentine syndicate uncovered additional showings on the Kenneth carrying silver-lead-zinc values over good widths. The main Moonlight vein in the American Creek section was further explored and high silver assays reported.

There was considerable activity in the mining of silver-lead ores in the Greenwood Mining Division where Bell Mines Ltd., operated the Bell and Highland Lass continuously throughout 1932. Sally Mines, adjoining the Bell, carried on stoping operations and ore was prepared for shipment to the smelter. Shipments of silver bearing ore were also made from the Wellington.

The smaller silver-lead-zinc operators in the West Kootenay continued to mark time pending improvement in metal prices and the only customs shipments made were by lessees at the Silver-smith, Bosun, Victor, Rio and Cliff properties in the Slocan division.

DISTRICT OF MACKENZIE

Deposits of lead ore situated about 32 miles southwest of Fort Resolution on Great Slave Lake were actively explored in 1929 by the Atlas Exploration Company. It is stated that the occurrences are of considerable economic importance and resemble to some extent those of the lead-zinc deposits in Missouri and other Mississippi valley states.

Exploration work was carried out by Eldorado Gold Mines Limited on its pitchblende silver deposits at Labine Point on the east side of Great Bear Lake. These were discovered in 1930 and represent the most important discoveries of high-grade native silver ores in Canada during recent years. The first commercial shipments of radium-silver ores were made from this area in 1932.

YUKON

In Yukon the Treadwell Yukon Company permanently shut down the Wernecke mill in the Mayo district on November 16, 1932, after having been in operation since January 6, 1925. It is worthy of mention that this single unit mill, the most northerly on the American continent and operated by Diesel engine power, ran 94.05 per cent of the time between the two foregoing dates and recovered 94.7 per cent of the silver and 93.2 per cent of the lead from all ore milled. The shutdown followed complete exhaustion of all commercial ore in the Lucky Queen, Ladue and Sadie properties. The Wernecke camp has now been abandoned and equipment moved to the Elsa where operations will continue until that property is exhausted, probably some time late in 1933.

Table 51.—Shipments of Lead Ores and Concentrates from Canadian Mines, 1923-1932

(For years 1913 to 1922 see 1928 report on the Mineral Production of Canada)

Year	Shipment		Lead content in pounds	Silver content in ounces
	Tons	Value \$		
1923.....	76,886	4,692,755	66,770,926	3,745,129
1924.....	153,396	12,290,699	180,187,124	4,348,243
1925.....	208,588	15,420,756	237,675,311	6,024,213
1926.....	255,048	17,546,728	273,963,827	8,616,164
1927.....	275,328	13,044,514	308,903,620	8,831,840
1928.....	255,944	12,178,879	322,239,859	10,287,591
1929.....	258,203	15,990,117	328,877,236	10,177,926
1930*.....	259,630	11,024,912	336,976,074	10,172,485
1931*.....	193,370	5,678,421	253,963,266	8,502,392
1932.....	190,700	4,241,652	246,051,119	8,031,587

*Shipments in 1930 contained 168,774 pounds of copper and 22,834,702 pounds of zinc. In 1931 shipments contained 6,190 pounds of copper and 18,038,829 pounds of zinc, and in 1932, 16,076,584 pounds of zinc, also silver in silver-radium ore shipped from N.W.T.

Table 52.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry, in Canada, 1931 and 1932

Production	Ontario	British Columbia	Yukon	Canada
	Tons	Tons	Tons	Tons
1931				
Ore mined.....	17,251	1,645,662	47,819	1,710,732
Ore milled.....	17,251	1,614,589	47,793	1,679,633
Concentrates produced—lead.....	316	174,506	4,208	179,030
Concentrates produced—zinc.....		200,099		200,099
Concentrates produced—copper.....				
1932				
Ore mined.....		1,492,453	*40,175	1,532,628
Ore milled.....		1,467,066	38,614	1,505,680
Concentrates produced—lead.....		167,424	3,208	170,722
Concentrates produced—zinc.....		200,156		200,156
Concentrates produced—copper.....				

*Includes data on Silver-Radium ores mines in N.W.T.

Table 53.—Products shipped by Silver-Lead-Zinc Mines in Canada, 1931 and 1932

Location of mines	No. of mines shipping	Products shipped	Quantity shipped	Net value at shipping point	Total metal content as determined by settlement assay				
					Gold	Silver	Lead	Zinc	Copper
			Tons	\$	Oz.	Oz.	Lb.	Lb.	Lb.
1931									
British Columbia and Yukon.....	16	Lead ore.....	14,621	315,462	605	995,424	6,614,700	976,835	6,190
		Lead concentrates...	178,723	5,361,759	363	7,505,317	247,348,566	17,121,994	
		Zinc ore.....	199,949	84,578		341,870	13,558,857	197,535,849	
		Zinc concentrates*.....	383,858	588,976		4,412,839	265,369,134	215,122,663	
		Dry ore.....	26	1,200	63	1,651			
Canada.....	16		777,177	6,351,975	1,031	13,257,101	532,891,257	430,757,341	6,190
1932									
British Columbia and Yukon.....	22	Lead ore.....	18,838	305,299	1,523	852,880	5,851,533	818,876	
		Lead concentrates...	171,345	3,915,689	18,810	7,100,171	240,199,586	15,257,708	
		Zinc ore.....	200,156	914,713		357,934	13,666,316	198,993,788	
		Zinc concentrates*.....	517	20,664	535	78,536			
Canada....	22		390,856	5,156,365	20,868	8,389,521	259,717,435	215,070,372	

*In addition zinc concentrates were produced from copper-gold-silver-zinc ores see table 38.

†Contains silver-radium ores from N.W.T.

Table 54.—Destination of Shipments from Silver-Lead-Zinc Mines in Canada, 1931 and 1932

Product shipped	Tons shipped	Net value at shipping point	Total metal content as determined by settlement assay				
			Gold	Silver	Lead	Zinc	Copper
		\$	oz.	oz.	pounds	pounds	pounds
1931							
<i>To Canadian Smelters—</i>							
Lead ore.....	13,258	203,869	555	677,809	6,009,765	976,835	6,190
Lead concentrates.....	174,574	4,135,000	118	3,981,701	243,264,435	17,121,994	
Zinc ore.....	199,949	84,578		341,870	13,558,857	197,535,849	
Zinc concentrates*	383,858	588,976		4,412,839	265,369,134	215,122,663	
Dry ore.....	26	1,200	63	1,651			
Total.....	771,665	5,013,623	736	9,415,870	528,202,111	430,757,341	6,190
<i>To Foreign Smelters—</i>							
Lead ore.....	1,363	111,593	50	317,615	604,935		
Lead concentrates.....	4,149	1,226,759	245	3,523,616	4,084,131		
Zinc ore.....							
Zinc concentrates.....							
Dry ore.....							
Total.....	5,512	1,338,352	295	3,841,231	4,689,066		
1932							
<i>To Canadian Smelters—</i>							
Lead ore.....	18,609	266,598	1,516	745,831	5,548,630	818,876	
Lead concentrates.....	167,538	2,980,395	18,582	4,140,209	236,446,355	15,257,708	
Zinc ore.....							
Zinc concentrates*	200,156	914,713		357,934	13,666,316	198,993,788	
Dry ore.....	517	20,664	535	78,536			
Total.....	386,820	4,182,370	20,633	5,322,510	255,661,301	215,070,372	
<i>To Foreign Smelters—</i>							
Lead ore.....	229	38,701	7	107,049	302,903		
Lead concentrates.....	3,807	935,294	228	2,959,962	3,753,231		
Zinc ore.....							
Zinc concentrates.....							
Dry ore.....							
Total.....	4,036	973,995	235	3,067,011	4,056,134		

*Does not include zinc concentrates produced from copper-gold-zinc ores in Manitoba or Quebec.

†Includes silver-radium ore from N.W.T.

Table 55.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1931 and 1932

Province	Capital employed as represented by				
	Present value of buildings, fixtures, machinery, tools, equipment, etc.	Inventory value of materials on hand, stocks in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
1931	\$	\$	\$	\$	\$
Nova Scotia and Yukon.....	2,197,600	293,954	305,027	235,240	3,031,821
Quebec.....	3,187,158	27,300	.....	10,000	3,224,458
Ontario.....	7,786,453	91,925	.....	83,079	7,961,457
British Columbia.....	14,856,058	1,731,720	3,500	343,064	16,934,342
Canada.....	28,027,269	2,144,899	308,527	671,383	31,152,078
1932					
Quebec and Yukon.....	5,793,878	211,590	157,034	316,059	6,478,561
British Columbia.....	4,543,226	342,692	1,300	555,288	5,442,506
Canada.....	10,337,104	554,282	158,334	871,347	11,921,067

Table 56.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1931 and 1932

Province	1931						1932					
	On salary	Mine		Mill	Total	Salaries and wages	On salary	Mine		Mill	Total	Salaries and wages
		Surface	Under-ground					Surface	Under-ground			
						\$						\$
Nova Scotia and Yukon.....	18	63	39	12	132	347,602						
Quebec.....	5	15	5		25	31,982						
Ontario.....	18	28	52	6	104	174,752						
British Columbia.....	116	236	433	253	1,038	1,595,585	95	214	417	229	955	1,378,849
†Yukon and Quebec.....							20	62	36	11	129	340,337
Canada.....	157	342	529	271	1,299	2,149,921	115	276	453	240	1,084	1,719,186

†Includes data on silver-radium mining operations in N.W.T.

4. Commodity Statistics—including tables showing production by provinces, imports, exports, prices, and world output of Arsenic, Cobalt, Silver, Lead and Zinc

ARSENIC

Arsenic bearing minerals or ores are rather widespread in Canada. Nova Scotia has, in the past, produced arsenic bearing concentrates in the milling of auriferous quartz ores; at the present time the Canadian production comes from the treatment of the cobalt-silver ores of northern Ontario. In British Columbia auriferous arsenical concentrates were exported for some years by the Hedley Gold Mining Company for reduction in a Tacoma smelter. The Canadian production of arsenic in 1931 was recovered as a by-product by the Deloro Smelting and Refining Company, Deloro, Ontario.

Arsenic is utilized for various purposes; as an insecticide it is one of the principal constituents of Paris green and of lead and calcium arsenates; it is also employed as sodium arsenite for weed killing. Other uses include its adoption in the manufacture of certain glasses, cattle and sheep dips, paints, tanning supplies, wood preservatives and pharmaceutical preparations.

The most important source of arsenic outside the United States, and probably the most important potential source in the world, is the Boliden gold-copper-arsenic mine in Sweden. This mine is scheduled to be operated at the rate of 400,000 tons of ore annually, and since it carries 10 per cent arsenic, it could supply practically the entire world's demand.

Table 57.—Production of Arsenic in Canada, 1923-1932

(For production from 1885-1922, see Annual Report Mineral Production 1928)

Year	Arsenic in ore		White arsenic		Year	Arsenic in ore		White arsenic	
	tons	\$	tons	\$		tons	\$	tons	\$
1923.....	631	44,030	2,579	582,785	1928.....	708	16,539	2,008	176,513
1924.....	513	39,185	1,798	309,108	1929.....	766	17,314	1,849	154,006
1925.....	714	21,513	1,033	108,789	1930.....	1,011	34,523	1,250	95,004
1926.....	545	12,687	1,992	134,124	1931.....			1,787	135,170
1927.....	667	15,644	2,447	196,335	1932.....			1,212	98,714

Table 58.—Production (As_2O_3), Exports and Imports of Arsenic, for Canada, 1930-1932

	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
PRODUCTION—						
From arsenical concentrates exported.. lb.	1,773,540	19,599				
White arsenic and arsenic in other forms lb.	2,750,680	109,928	3,575,936	135,170	2,424,342	98,714
Total..... lb.	4,524,220	129,527	3,575,936	135,170	2,424,342	98,714
EXPORTS—						
Arsenic, As_2O_3 lb.	2,335,600	86,825	3,092,500	116,044	1,788,600	65,287
IMPORTS—						
White arsenic..... lb.	12,160	749	167,015	5,824	425,995	16,694
Sulphide of arsenic..... lb.	25,113	2,208	10,412	1,347	111,106	4,277
Arsenate of soda and stannate of..... lb.	2,968	350	704	202	5,603	1,159
Arsenate of lead..... lb.	1,069,383	112,768	1,248,460	116,996	830,120	80,488
Calcium arsenate..... lb.	655,619	36,211	821,509	42,107	521,546	27,852

Table 59.—World Production of Arsenic, 1930-1932

(Long tons)

(Supplied by Imperial Institute)

Country and product	1930	1931	1932	Country and product	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
<i>United Kingdom</i> —				<i>Germany</i> —			
White arsenic and arsenic				Ore (arsenic content).....	1,829	1,821	200
soot.....	579	177	247	<i>Greece</i> —			
<i>Southern Rhodesia</i> —				White arsenic.....	828	649	379
White arsenic.....	49			<i>Yugoslavia</i> —			
<i>Union of South Africa</i> —				Ore.....	7		(a)
White arsenic.....	15	9	4	<i>Portugal</i> —			
<i>Canada</i> —(Sales)—				White arsenic.....		156	10
Gold concentrates (As ₂ O ₃				<i>Sweden</i> —			
content).....	903			Ore (arsenic content).....	4,281	11,005	(a)
White arsenic.....	1,116	1,596	1,082	<i>Algeria</i> —			
<i>Federated Malay States</i> —				Arsenate of lead (arsenic			
Arsenic.....	225	133		content).....	346		
<i>Australia</i> —				<i>Mexico</i> —			
White arsenic.....	796	1,070	1,964	White arsenic, etc. (arsenic			
				content).....	9,819	6,406	3,707
FOREIGN COUNTRIES				<i>United States</i> —			
<i>Belgium</i> (exports)—				White arsenic.....	15,229	15,301	11,343
White arsenic.....	3,062	2,462	2,013	<i>China</i> —			
<i>Czechoslovakia</i> —				White arsenic.....	967	500	(a)
Arsenical pyrites.....	2		(a)	<i>Japan</i> —			
<i>France</i> —				White arsenic.....	1,627	2,547	(a)
Ore (arsenic content).....	5,065	5,680	(a)	<i>Turkey</i> —			
White arsenic.....	3,888	4,300	(a)	Arsenic ore.....	22	22	3
				<i>Brazil</i> —			
				White arsenic.....		176	(a)

(a) Information not available.

NOTE.—About 5,000 tons of ore were recorded as produced in the U.S.S.R. (Russia) during 1927—later figures are not available. White arsenic is produced in Germany.

COBALT

Canadian cobalt production in 1932 included the cobalt content of the various cobalt products sold by the Deloro Smelting and Refining Company, Deloro, Ontario, and the cobalt content of all ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Canada's production of cobalt which amounted to 490,631 pounds in 1932, was considerably less than that of the preceding year. This was largely due to the continued adverse industrial conditions prevailing throughout the world since 1929.

Following the discovery of the cobalt camp in 1903, and until quite recently, the greater part of the world's supply of cobalt was derived from the treatment of ores mined in that area. Two companies, the Coniagas Reduction Company of Thorold, Ontario (closed since 1926), and the Deloro Smelting and Refining Company, Limited, Deloro, Ontario, developed processes for the recovery of cobalt from these ores. (For a description of smelter practice see 1929 mineral production of Canada).

In 1922 the average price of \$3.25 per pound was used in computing the annual production value; \$2.85 was the price used for 1923 and from 1924 to date the values given in the report have been based on returns actually received by the operators. In 1932 the market quotations for cobalt were: metal, \$2.50 per pound; cobalt oxide, \$1.35 per pound.

A bounty of six cents a pound on the metallic content of cobalt and nickel oxides was paid by the Ontario government from 1907 to 1917.

In the years immediately preceding the war the average annual world production of cobalt in terms of metal was 400 tons of which 99 per cent came from Canada and about 1 per cent from Germany. In the post war years the German cobalt industry further declined and came practically to an end about 1928. Germany has, however, preserved its leading position as a manufacturer of cobalt compounds from imported raw materials. In 1931 about 53 per cent of the world cobalt supplies came from the Belgian Congo, about 33 per cent from Canada, and about 14 per cent from Burma. New Caledonia, which occupied the leading position as a world cobalt supplier in the early years of the present century has ceased producing since 1927. Shortly after

the war a rich cobalt ore deposit was discovered in Queensland, Australia. This was developed in 1921; owing to the competition of other and cheaper producers the industry declined here and accounted for only 3 tons in 1930. It is believed that about 200 to 300 tons a year of high-grade cobalt ores are worked up in China and that the cobalt oxide thus produced is used entirely in the Chinese porcelain industry. The most important factor today in the world cobalt market is the Belgian Congo, in which the production of cobalt bearing ores from the Katanga mines commenced about 1922, the cobalt containing material is shipped from Katanga to Belgium where it is worked up in metal and compounds in plants at Oolen. "Die Chemische Industrie."

The results of almost continuous research on cobalt during recent years are apparent in the many growing and diversified uses for this metal; its oxides are utilized as pigments in the manufacture of earthenware; cobalt salts are employed as driers in the paint and varnish industry, and the alloys exhibit a wide range of usefulness including their adoption as filaments in radio tubes, motor valves, abrasion resisters, steam turbine blades, cutting tools and various other applications, especially where stress resistance under extreme temperatures is a necessary factor.

A summary of the cobalt production from 1923 is shown in the following table. The quantities given are the cobalt content of all smelter products sold or shipped, such as cobalt metal, the oxides, mixed oxides, residues, etc.

Table 60.—Production of Cobalt from Canadian Ores, 1923-1932

Year	Pounds	Year	Pounds
1923.....	760,105	1928.....	956,590
1924.....	948,704	1929.....	929,415
1925.....	1,116,492	1930.....	694,163
1926.....	664,778	1931.....	521,051
1927.....	880,590	1932.....	490,631

NOTE.—For years 1904 to 1922, see previous reports.

Table 61.—Production in Canada, and Exports of Cobalt, 1930-1932

	1930		1931		1932	
	Pounds	\$	Pounds	\$	Pounds	\$
PRODUCTION— Cobalt, computed as cobalt in metal, oxides and salts sold, and in ores and residues exported.....	694,163	1,144,007	521,051	651,179	490,631	587,957
EXPORTS— Cobalt alloys, cobalt metallies cobalt oxides, cobalt salts and cobalt ores.....		1,319,870		735,225		589,334

Table 62.—World Production of Cobalt, 1930-1932

(Supplied by *Imperial Institute*)

Country	1930	1931	1932
	Cwt.	Cwt.	Cwt.
BRITISH EMPIRE			
Canada (c).....	6,198	4,652	4,381
India (b).....	2,200	2,000	2,500
Australia (metal).....	70		60
FOREIGN COUNTRIES			
Belgian Congo (d).....	14,000	7,280	6,590
French Morocco (ore).....			11,220

NOTE.—Complex ores containing cobalt are also found in Germany and China, but cobalt content is not available.

(b) Estimated cobalt content of nickel-speiss exported to Hamburg.

(c) Metal recovered from smelter products plus cobalt contained in cobalt residues exported.

(d) Content of metal, oxides and salts produced at Oolen (Belgium) from ores raised in the Belgian Congo.

SILVER

A small quantity of silver was recovered during 1932 from crude gold bullion produced in Nova Scotia; in Quebec the silver output in 1932 came entirely from the metal recovered from auriferous quartz ores, Noranda blister copper, and copper concentrates shipped by the Consolidated Copper and Sulphur Company, Ltd.

Ontario produced 6,335,788 ounces, 75.5 per cent of which was in the form of bullion made from cobaltiferous ores; the balance was contained in concentrates exported, in gold bullion produced at gold mines, in nickel-copper ores mined in the Sudbury district and in gold, silver or copper ores shipped to the Noranda and Trail smelters.

Manitoba's silver production came from gold bullion produced from auriferous quartz ores and from blister copper made at the Flin Flon smelter; the output for 1932 showed a substantial gain over that for 1931 owing to expanded copper smelting operations by the Hudson Bay Mining and Smelting Company, Ltd., at the new Flin Flon plants.

An output of 7,293,462 fine ounces of silver in British Columbia during 1932 was considerably less than the 1930 high production record for this metal. The principal silver producing mines were the Sullivan, Premier, Bell, Wellington and Union; small recoveries were made in the refining of bullion produced in alluvial and auriferous quartz mining. Silver contained in copper ores and concentrates exported to foreign smelters and in blister copper made at the Granby smelter contributed considerably to the total silver production.

Silver production in the Yukon at 3,053,188 ounces and including a small output from Great Bear Lake, Northwest Territories, was slightly less than that of 1931; this decrease was largely the result of lessened exports of silver-lead concentrates.

Producers of both silver-lead and cobalt-silver ores in Canada have suffered considerably since 1930 through the almost unprecedented decline in the price of metals and in some instances it was only by efficient mining, low costs and the ability to recover and market the combined or some of the associated metals that continuity of mining operations was possible.

Silver prices on the New York exchange in 1932 ranged from a high of 30.136 cents per fine ounce for the February average to a low of 25.010 for the month of December. The average yearly price of silver, in Canadian funds, computed from daily New York quotations was 31.67163 cents per troy ounce.

On December, 29, 1932, a second low price of $24\frac{1}{4}$ cents per ounce for silver was quoted in New York. Handy and Harmon in a review of the silver market for 1932 state that the paramount factor affecting silver during 1932 was the tremendous shrinkage in demand from the Orient. Ordinarily India and China absorb approximately 75 per cent of the world production of newly mined metal. In 1929, when production reached its peak of 260,000,000 ounces, the net imports of these two countries amounted to 218,500,000 ounces or nearly 84 per cent. During the past year, although production declined to 160,000,000 ounces, India and China consumed only 52,000,000 ounces or 32 per cent.

A bulletin issued by the United States Department of Commerce states that as a result of shortage of gold reserves, various foreign countries during the past two years have made provision for the more extensive use of silver in their monetary systems. Prominent among these is Germany, which in July 1932, raised the maximum for silver coinage from 20 to 30 reichsmarks per capita. Other countries in which the monetary use of silver is being increased, the bulletin shows, include France, Colombia, Cuba, Mexico, Peru and Roumania. Important discussions relating to silver were conducted at the World Economic Conference in London in 1933.

Fine silver is commercially available as sheet of all gauges down to thin, transparent, hand-beaten foil; tubes of all diameters, either welded or, up to about 2 inches seamless drawn; and wire, either rolled or drawn down to 0.0005 inches.

The most extensive application to chemical plant evident to date is in the condensation and general handling of acetic acid, the use of silver is spreading to other allied trades and also to the food industries. Fine silver stills and condensers and silver alloy taps and cocks are being generally employed to overcome the manifold troubles experienced in these particular industries.

"Chemical Age" reports that work has lately been carried out on alloys of silver with zinc, cadmium and tin respectively. . . . the silver-zinc alloys containing 10 to 40 per cent of zinc are characterized by high mechanical strength. It is interesting to note that the alloy represented by the formula Ag_2Zn_3 possesses a pink colour. . . . good rolling properties are possessed by silver-cadmium alloys with proportions of cadmium up to 40 per cent.

Table 63.—Production of Silver in Canada, by Provinces and by Sources, 1931 and 1932

	1931		1932	
	Quantity	Value	Quantity	Value
	Fine ounces	\$	Fine ounces	\$
NOVA SCOTIA—				
In gold bullion—Total.....	48	14	47	15
QUEBEC—				
In gold ores, in blister copper, and in copper ores exported—Total..	530,345	158,414	628,902	199,184
ONTARIO				
In silver bullion and nuggets.....	6,100,055	1,822,086	4,781,174	1,514,276
In gold bullion.....	357,311	106,729	426,703	135,144
In blister copper produced; and in ores, concentrates, residues and matte exported or treated in smelters outside the province.....	981,585	293,199	1,127,911	357,228
Total.....	7,438,951	2,222,014	6,335,788	2,006,648
MANITOBA—				
In gold bullion and in blister copper—Total.....	836,547	249,877	1,036,497	328,275
SASKATCHEWAN—				
In ores shipped to smelters'—Total.....			14	4
ALBERTA—				
In alluvial gold—Total.....	29	9	9	3
BRITISH COLUMBIA—				
In alluvial gold.....	3,091	923	3,672	1,163
In gold bullion.....	6,843	2,044	11,329	3,588
In blister copper.....	820,715	245,148	596,810	189,019
In base bullion and in ores exported.....	7,230,950	2,159,885	6,681,651	2,116,188
Total.....	8,061,599	2,408,000	7,293,462	2,309,958
*YUKON AND NORTHWEST TERRITORIES—				
In alluvial gold.....	9,914	2,961	9,084	2,877
In ores exported or shipped to Canadian smelters.....	3,684,814	1,100,654	3,044,104	964,117
Total.....	3,694,728	1,103,615	3,053,188	966,994
Canada.....	29,562,247	6,141,943	18,347,907	5,811,081

*Includes production from Northwest Territories in 1932 only.

Table 64.—Production of Silver in Canada, 1923-1932

Year	Fine ounces	Value	Cents per ounce (Canadian funds)	Year	Fine ounces	Value	Cents per ounce (Canadian funds)
		\$				\$	
1923.....	18,601,744	12,067,509	64-873	1928.....	21,936,407	12,761,725	58-176
1924.....	19,736,323	13,180,113	66-781	1929.....	23,143,261	12,264,308	52-993
1925.....	20,228,988	13,971,150	69-065	1930.....	26,443,823	10,089,376	38-154
1926.....	22,371,924	13,894,531	62-107	1931.....	20,562,247	6,141,943	29-87
1927.....	22,736,698	12,816,677	56-370	1932.....	18,347,907	5,811,081	31-67

NOTE.—For years 1887 to 1922 see previous reports.

Table 65.—Production of Silver by Principal Silver-producing Provinces, 1923-1932

(For the years 1887 to 1922 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		Manitoba		British Columbia		Yukon Territory	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
		\$		\$		\$		\$		\$
1923.....	33,006	21,412	10,540,943	6,838,226	5	3	6,113,327	3,965,899	1,914,438	1,241,953
1924.....	83,814	55,972	11,272,567	7,527,933	140	93	8,153,003	5,444,657	226,755	151,429
1925.....	214,943	148,451	10,529,131	7,271,944	477	329	8,579,458	5,925,403	904,893	624,964
1926.....	375,986	233,513	9,274,965	5,760,402	18	11	10,625,816	6,599,376	2,095,027	1,301,159
1927.....	740,864	417,625	9,307,953	5,246,893	12	7	11,040,445	6,223,499	1,647,295	928,580
1928.....	908,959	528,796	7,242,601	4,213,456	1,763	1,026	10,943,367	6,366,413	2,839,633	1,651,985
1929.....	813,821	431,268	8,890,726	4,711,462	2,644	1,401	10,156,408	5,382,185	3,279,530	1,737,922
1930.....	571,164	217,922	10,205,683	3,893,876	94,653	36,114	11,825,930	4,512,065	3,746,326	1,429,373
1931.....	530,345	158,414	7,438,951	2,222,014	836,547	249,877	8,061,599	2,408,000	3,694,728	1,103,615
1932†.....	628,902	199,184	6,335,788	2,006,648	1,036,497	328,275	7,293,462	2,309,958	3,053,188	966,994

†N.W.T. production included with Yukon.

For data relating to silver in mine shipments from Cobalt District and nearby camps in Ontario, see previous reports.

Table 66.—Imports into Canada and Exports of Silver, 1930-1932

	1930		1931		1932	
	Fine ounces	\$	Fine ounces	\$	Fine ounces	\$
IMPORTS—						
Silver in bars, blocks, ingots, drops, sheets or plates unmanufactured.....		610,634		467,404		585,788
Silver, manufactures of n.o.p., and articles consisting wholly or in part of sterling or other silverware.....		199,123		115,127		94,108
Silver, and other coin, foreign, except gold.....				260		
Total.....		809,757		582,791		679,896
EXPORTS—						
Silver contained in ore, concentrates, etc.....	8,473,189	3,401,340	4,017,182	1,168,261	3,488,094	982,652
Silver bullion.....	15,778,755	6,180,412	14,649,185	4,230,998	13,504,060	3,978,438
Total.....	24,251,944	9,581,752	18,666,367	5,399,259	16,992,154	4,961,090
Silver coin—Foreign.....		2,417,822		3,447,323		808,695
“ “ Canadian.....		30		17,461		86,689

Table 67.—Monthly Average Prices of Silver, 1930-1932

(From the Engineering and Mining Journal)

Month	New York (Cents per fine ounce) ·999 fine			London Spot (Pence per standard ounce) ·925 fine		
	1930	1931	1932	1930	1931	1932
January.....	45-000	29-423	29-780	20-896	13-810	19-623
February.....	43-193	26-773	30-136	20-008	12-432	19-573
March.....	41-654	29-192	29-810	19-298	13-524	18-336
April.....	42-428	28-279	28-298	19-554	13-120	16-923
May.....	40-736	27-650	27-755	18-850	12-858	16-868
June.....	34-595	27-250	27-466	16-049	12-707	16-844
July.....	34-346	28-255	26-700	15-928	13-197	16-930
August.....	35-192	27-524	27-986	16-283	12-815	18-000
September.....	36-315	28-180	27-870	16-738	14-101	17-998
October.....	35-846	29-538	27-195	16-563	17-153	17-813
November.....	35-908	32-223	26-698	16-625	19-393	18-099
December.....	32-635	30-120	25-010	15-201	20-023	17-110
Average.....	38-154	28-700	27-892	17-666	14-594	17-843

Using the par of exchange in New York for the first 9 months of 1931 and the average monthly rate of exchange for each of the last three months, the average value of silver in Canadian funds for the year was 29-87 cents per fine ounce. The average yearly price of silver in Canadian funds during 1932, computed from daily New York quotations was 31-67163 cents per troy ounce.

World Production.—The principal silver producing countries of the world are Mexico, the United States, Canada, Australia, India and Peru. The total world output for 1932, as computed by the American Bureau of Metal Statistics, was 168,737,400 fine ounces as against 198,847,205 in 1931.

Table 68.—Comparative Figures of Silver Production, for the World, Mexico, the United States, Peru and Canada, 1923-1932

Year	World's Output*	Mexico's Output*	United State's Output*	Peru's Output*	Canada's Output
	Fine ounces	Fine ounces	Fine ounces	Fine ounces	Fine ounces
1923.....	246,009,534	90,859,083	73,295,810	18,654,793	18,601,744
1924.....	239,484,703	91,486,136	65,366,840	18,717,087	19,736,323
1925.....	245,213,993	92,885,465	66,106,922	19,917,439	20,228,988
1926.....	253,795,166	98,291,166	62,672,953	21,499,798	22,371,924
1927.....	251,096,555	104,573,919	60,394,199	18,295,408	22,736,698
1928.....	257,925,154	108,537,307	58,426,004	21,607,693	21,936,407
1929.....	260,970,029	108,871,442	61,233,321	21,495,169	23,143,261
1930†.....	247,000,000	105,204,059	47,724,903	14,372,593	26,443,823
1931.....	196,000,000	86,064,457	29,856,628	11,048,000	20,562,247
1932.....	146,000,000	53,228,119	22,651,822	6,317,000	18,347,907

*Prior to 1930 from Annual report of the "Director of the Mint," Washington.

†Beginning with 1930 figures from the *Imperial Institute*.

NOTE.—For years 1898 to 1922 see previous reports.

Table 69.—World Production of Silver Ore, 1930-1932

(In terms of metal)

(Supplied by *Imperial Institute*)

(Fine ounces)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES— Con.			
United Kingdom.....	40,955	33,989	16,043	Sweden.....	191,260	362,491	(a)
Bechuanaland Protectorate.....	375	662	1,676	Algeria.....	171,199	258,000	50,000
Gold Coast (estimated).....	8,200	8,900	9,000	Morocco (French zone).....	64,000	11,000	(a)
Kenya.....	155	288	.....	Mozambique.....	38	60	257
Nigeria.....	50,500	251,855	85,368	Tunis.....	105,000	60,764	5,859
Northern Rhodesia.....	637	589	339	Mexico.....	105,204,059	86,064,457	53,228,119
Southern Rhodesia.....	72,720	75,960	114,555	United States.....	47,724,903	29,856,628	22,651,822
South West Africa (d).....	1,003,000	639,000	165,000	Costa Rica (c).....	.....	300	.....
Tanganyika Territory.....	1,278	1,691	3,313	Guatemala (c).....	.....	.....	143,500
Union of South Africa.....	1,050,038	1,063,050	1,120,668	Honduras.....	2,957,120	3,689,791	(c) 3,158,683
Canada.....	26,443,823	20,562,247	18,347,907	Nicaragua (c).....	38,103	36,485	55,375
British Guiana (estimated).....	780	1,340	1,830	Panama.....	(c)	2,800	(a)
India.....	7,072,050	5,923,005	6,026,737	Salvador (c).....	.....	580	4,822
Federated Malay States (estimated).....	2,600	2,600	2,400	Argentina (b).....	15,000	15,000	15,000
Australia.....	10,075,002	6,730,227	9,460,369	Bolivia (exports).....	7,091,000	5,772,307	4,115,232
New Zealand.....	(e) 565,860	434,822	562,792	Brazil (b).....	20,000	10,000	(a)
Total.....	46,400,000	35,700,000	35,900,000	Chile.....	760,465	372,361	73,422
FOREIGN COUNTRIES				Colombia (estimated).....	54,000	66,000	84,000
Austria.....	30,446	82,626	18,785	Ecuador (b).....	106,127	104,762	(a)
Czechoslovakia.....	1,469,004	1,231,778	(a)	Guiana (French and Dutch) (b).....	7,500	6,000	(a)
France.....	652,000	517,600	(a)	Peru.....	14,372,593	11,048,000	6,317,000
Germany.....	5,485,433	5,784,589	5,992,760	Venezuela (b).....	4,000	4,000	4,000
Greece.....	264,607	132,081	170,200	China.....	145,000	186,000	(a)
Italy.....	506,301	438,117	375,000	Formosa.....	200,500	(a)	132,900
Yugoslavia.....	559,000	1,643,800	2,018,100	French Indo-China.....	3,900	4,500	(a)
Norway.....	401,334	312,104	314,781	Japan.....	5,628,306	5,586,551	5,241,587
Poland.....	561,191	365,104	(a)	Korea.....	75,431	367,872	(a)
Roumania.....	142,039	114,261	(a)	Netherlands East Indies.....	2,094,261	1,472,993	842,365
Hungary.....	(a)	(a)	12,819	Turkey.....	(b) 220,000	155,457	(a)
Spain.....	2,819,169	3,098,713	901,004	Philippine Islands.....	110,278	110,008	149,131
				Total.....	200,000,000	160,000,000	110,000,000
				World's Total.....	247,000,000	196,000,000	146,000,000

NOTE.—623,389 fine ounces of silver were recorded as produced in U.S.S.R. (Russia) during year ended Sept. 1928—later figures are not available.

(a) Information not available.

(b) Estimates of the United States Mint.

(c) Imports into the United States from the country indicated.

(d) Years ended March 31 of the year following that stated.

(e) Silver content of exports, excluding jewellers' sweepings.

Table 70.—World Silver Consumption, Production and Supplies,* 1931 and 1932

(in millions of fine ounces)

Consumption			World Silver Production Supplies		
	1931	1932		1931	1932
India.....	57.0	12.0	Production: —		
China (including Hong Kong).....	59.0	40.0	United States.....	30.8	24.0
German Consumption.....	28.2	22.8	Mexico.....	86.1	69.6
Arts and Industries—			Canada.....	20.4	18.3
In the United States and Canada.....	30.5	22.0	South America.....	17.6	12.8
In England.....	10.0	8.0	All other countries.....	38.9	39.0
In Mexico.....	1.0	1.0	Other Supplies:—		
Coinage—			Demonetized coin:—		
Germany.....	18.7	20.0	Indo-China.....	6.4	10.0
Mexico.....		24.6	Siam.....	20.0	
Cuba.....		2.8	Mexico.....	4.2	
Yugoslavia.....		0.5	Egypt.....	2.9	
United States.....	2.4	1.2	Russia.....		12.1
Unaccounted for.....	55.5	55.9	Near East.....		1.0
			Sales by Indian Government.....	35.0	24.0
Total.....	262.3	210.8	Total.....	262.3	210.8

*From Review of the Silver market for 1932 by Handy and Harman.

LEAD

CANADA

Canada's lead production includes (a) lead contained in ores and concentrates exported, less deductions for smelter losses, valued at the average price in London for the year; (b) the lead contained in the base bullion made by the Consolidated Mining and Smelting Company, Ltd., at Trail, B.C., and the lead in a silver-lead-bismuth bullion produced at the Deloro smelter in Ontario, valued at the average price in London for the year.

Production in 1932 included lead from the O'Brien mine in Ontario, from the Sullivan mine in East Kootenay, British Columbia, and from several other properties producing in the Slocan, Portland canal and other districts of the same province. Important quantities of lead were contained in silver-lead concentrates exported from the Yukon by the Treadwell-Yukon Mining Company.

Previous to 1904, lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces to a base bullion which was exported for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C., since 1904; this refinery treats the product from the Consolidated Mining and Smelting Company's blast furnaces. A great advance in 1931 at Trail was made in the lead smelting plant through the operation of the new slag-fuming installation. This plant has produced and can continue to produce 23 per cent more zinc and 4 per cent more lead from the same ore than was formerly possible.

A Canadian lead production of 255,947,378 pounds in 1932 represents a 4.3 per cent decrease in quantity from that for the previous year. This resulted largely from the exceptionally low prices for the metal, and international industrial depression.

Important quantities of lead are consumed in the storage battery, cable and pigments industries; The American Bureau of Metal Statistics shows the use of lead in the United States in 1932 by percentages as follows: cable covering, 13.75 per cent; storage batteries, 34.50 per cent; white lead, 13.62 per cent; building, 5.50 per cent; ammunition, 5.82 per cent; red lead and litharge, 3.95 per cent; and the balance in solder, bearing metals, etc.

The Mining Journal, London, reports that the International Association of Lead Producers ("Lead Pool") which was formed in October, 1929, was dissolved at the beginning of March, 1932, the main immediate cause of the dissolution being the introduction of the 10 per cent British tariff. . . . The 15 per cent restriction of output introduced in May, 1931, and increased to 20 per cent in July had proved quite insufficient to bring production into line with consumption, let alone to enable any reduction in stocks to be effected, and efforts have been made to bring about the re-establishment of the Pool and the restriction of production by a considerably greater amount. . . . Prices of fabricated lead products have not fallen (in Great Britain) by anything like the same percentage compared, say, with 1929, as that of lead itself. This fact undoubtedly underlay the decision of certain Empire producers to enter the accumulator, battery and oxide business themselves.

Table 71.—Production* of Lead from Canadian Ores, 1923-1932

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1923.....	111,234,466	7,985,522	1928.....	337,946,688	15,553,231
1924.....	175,485,499	14,221,345	1929.....	326,522,566	16,544,248
1925.....	253,590,578	23,127,460	1930.....	332,894,163	13,102,635
1926.....	283,801,265	19,240,661	1931.....	267,342,482	7,260,183
1927.....	311,423,161	16,477,139	1932.....	255,947,378	5,409,704

*The data given represent the quantity of lead produced in Canada from domestic ores, together with the estimated lead recovery from lead ores and concentrates exported.

NOTE.—For years 1887 to 1922 see previous reports.

Table 72.—Production of Lead from Canadian Ores, by Provinces, 1923-1932

(For years 1887 to 1922 see 1928 report on the Mineral Production of Canada)

Year	Quebec		Ontario		British Columbia		Yukon	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
1923.....	520,041	37,334	4,401,494	315,983	99,541,818	7,146,107	6,771,113	486,098
1924.....	1,058,983	85,820	5,055,368	409,687	168,467,628	13,652,617	903,520	73,221
1925.....	2,051,100	187,060	7,209,534	657,510	242,454,502	22,111,850	1,875,442	171,040
1926.....	3,729,636	251,788	7,398,795	580,730	266,812,461	18,012,509	5,860,373	395,634
1927.....	6,496,577	341,461	7,990,709	528,729	292,770,544	15,388,020	4,165,331	218,929
1928.....	6,218,336	284,520	6,814,757	402,289	317,722,146	14,537,377	7,191,449	329,045
1929.....	5,358,304	270,616	4,769,506	294,431	307,999,153	15,555,189	8,395,603	424,012
1930.....			2,193,856	116,034	321,803,725	12,637,232	8,896,582	349,369
1931.....			985,633	41,647	261,902,236	7,097,812	4,454,613	120,724
1932.....			86,477	1,828	252,007,574	5,326,432	3,853,327	81,444

Table 73.—Refined Lead Produced in Canada,* 1923-1932

Year	Pounds of refined lead produced	Year	Pounds of refined lead produced
1923.....	101,096,312	1928.....	301,067,819
1924.....	130,471,208	1929.....	304,449,673
1925.....	213,217,005	1930.....	304,471,706
1926.....	257,273,585	1931.....	278,448,457
1927.....	295,766,327	1932.....	253,136,522

*Includes the electrolytic lead produced from Canadian and foreign ores at Trail, B.C.; and also the pig lead from Gal-etta, Ont., until 1931.

NOTE.—For years 1904 to 1922 see previous reports.

Table 74.—Available Statistics on the Consumption of Lead in Specified Canadian Manufacturing Industries, 1930-1932

Industries	Items (Used)	1930	1931	1932
		Pounds	Pounds	Pounds
Paints and Pigments.....	Pig lead.....	18,339,000	14,582,000	11,415,000
White Metal Alloys.....	Pig lead.....	13,279,000	12,395,000	6,362,000
White Metal Alloys.....	Scrap lead.....	5,050,000	5,007,000	3,119,000
Electrical Apparatus.....	Pig lead.....	25,382,000	15,292,000	12,108,000
Electrical Apparatus.....	Scrap lead.....		177,000	132,000
Electrical Apparatus.....	Lead sheets.....	117,000	447,000	34,000
Iron and Steel.....	Lead.....	1,106,000	773,000	633,000
Grand Total.....		63,273,000	48,673,000	33,803,000

Table 75.—Imports into Canada and Exports of Lead, 1930-1932

	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
IMPORTS—						
Old and scrap, pig and block.....	764,305	32,029	256,978	8,749	28,398	1,436
Bars and sheets.....	1,521,359	95,793	539,654	24,535	159,026	6,893
Litharge.....	2,865,600	213,240	3,866,100	232,280	2,284,700	125,385
Acetate of lead not ground.....	172,387	16,496	102,955	9,146	124,169	8,195
Nitrate of lead not ground.....	150,904	10,066	102,461	6,183	160,483	9,693
Other manufactures, n.o.p.....		244,270		162,720		129,629
Pipe lead.....	369,082	23,067	127,525	5,750	31,006	1,350
Shots and bullets.....	9,043	907	8,699	791	7,480	650
Tea lead.....	17,920	1,430	17,780	1,275		
Lead arsenate.....	1,069,383	112,769	1,248,460	116,996	830,120	80,488
*Lead tetraethyl, compounds of.....	306,733	339,058	1,205,305	1,363,269	1,525,825	1,517,639
Lead pigments—						
Dry white lead.....	47,287	4,099	95,470	7,084	8,412	629
White lead, ground in oil.....	58,662	5,894	53,119	4,736	13,632	1,174
Dry red lead and orange mineral.....	1,352,076	110,075	1,491,320	98,103	620,520	38,065
Total.....		1,299,193		2,041,617		1,921,226
EXPORTS—						
Lead in ore.....	26,323,200	1,258,272	4,421,700	176,964	3,713,300	148,518
Lead in pigs, refined lead, etc.....	205,432,600	7,015,308	216,425,800	4,482,812	213,990,700	3,269,121
Total.....	231,755,800	8,273,580	220,847,500	4,659,776	217,704,000	3,417,639

*From April 1 to Dec. 31, 1930.

Table 76.—Monthly Average Prices of Pig Lead, Montreal,* New York and London,† 1930-1932

Month	Montreal (Value in cents per pound)			New York (Value in cents per pound)			London‡ (Value in pounds sterling per long ton)		
	1930	1931	1932	1930	1931	1932	1930	1931	1932
January.....	6-50	4-640	4-260	6-250	4-802	3-750	21-545	13-872	15-084
February.....	6-42	4-530	4-148	6-236	4-552	3-712	21-188	13-444	14-560
March.....	5-95	4-510	3-850	5-662	4-527	3-150	18-807	13-128	12-345
April.....	5-65	4-250	3-609	5-537	4-412	3-000	18-319	12-375	11-223
May.....	5-33	3-930	3-320	5-523	3-818	3-000	17-795	11-491	10-673
June.....	5-36	3-920	3-145	5-410	3-917	2-993	17-941	11-582	9-608
July.....	5-36	4-135	3-083	5-250	4-400	2-747	18-160	12-731	9-818
August.....	5-40	3-964	3-217	5-488	4-400	3-235	18-294	11-944	11-349
September.....	5-32	3-800	3-482	5-500	4-400	3-465	17-909	11-932	13-122
October.....	4-82	3-905	3-264	5-151	3-964	3-052	15-747	13-227	11-958
November.....	4-91	4-162	3-373	5-100	3-937	3-050	15-954	14-577	12-071
December.....	4-93	4-268	3-386	5-100	3-792	3-000	15-283	15-188	11-144
Average.....	5-49	4-168	3-511	5-517	4-243	3-180	18-077	12-958	11-913

*Producers' prices for car load quantities ex-cars Montreal, as furnished by the Consolidated Mining and Smelting Company.

†From the *Engineering and Mining Journal*.

‡Transposed into Canadian funds at par the average value of lead in 1930 was 3-927 cents per pound. In 1931 using the par of exchange in London for the first 9 months and the average monthly rate of exchange for each of the remaining three months the average value of lead for the year in Canadian funds was 2-7101 cents per pound.

The average price of lead for 1932, based on daily quotations in London and transposed to Canadian funds, was 2-1136 cents per pound.

Table 77.—World Production of Lead Ore, 1930-1932

(In terms of metal)
(Supplied by Imperial Institute)
(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	20,304	23,602	32,913	— Con.			
Nigeria (estimated)...	370	1,310	440	Norway.....	639	867	844
N. Rhodesia				Poland.....	11,300	8,000	5,000
(smelter).....				Portugal.....		40	
S. Rhodesia	4			Roumania (smelter)...	969	1,293	(a)
S.W. Africa (b).....	28,500	14,100	5,000	U.S.S.R. (smelter)...	10,580	11,000	(a)
Union of S. Africa.....	6	39	68	Spain (smelters).....	121,317	107,899	112,486
Canada (c).....	148,613	119,349	114,262	Spitzbergen.....		77	(a)
Newfoundland.....	17,928	27,971	35,601	Sweden.....	5,835	8,237	6,700
India.....	114,400	89,000	78,800	Algeria.....	7,628	5,300	2,250
Australia.....	197,595	150,764	210,566	Egypt.....	70		
Total.....	530,000	430,000	480,000	Morocco (French)....	4,169	718	1,750
FOREIGN COUNTRIES				Tunis.....	14,100	13,418	6,289
Austria.....	8,754	1,646	4,735	Mexico (c).....	237,132	223,199	135,231
Bulgaria (estimated)...	1,200			United States (c)....	498,494	361,270	259,742
Czechoslovakia.....	6,500	4,604	(a)	Argentina.....	2,908	3,738	2,959
Finland.....	180		150	Bolivia (exports)....	11,826	6,564	5,402
France.....	10,456	7,000	5,000	Chile.....	664	(a)	(a)
Germany.....	67,579	53,404	50,145	Peru.....	19,462	3,427	3,800
Greece.....	7,686	6,043	6,500	China (estimated)...	4,900	3,800	(a)
Italy.....	29,445	23,727	20,900	French Indo-China...	20	6	
Yugoslavia.....	22,000	44,500	50,318	Japan (smelter).....	3,524	4,006	4,000
Hungary (estimated)...	800	(a)	(a)	Korea.....	12		(a)
				Turkey.....	4,590	2,161	(a)
				New Caledonia.....	500		
				Total.....	1,110,000	910,000	700,000
				World's Total.....	1,649,000	1,340,000	1,180,000

(a) Information not available.

(b) Years ended March 31 of the year following that stated.

(c) Amount estimated as recoverable.

Table 78.—World Metal Production of Lead, 1930-1932

(Supplied by Imperial Institute)
(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	10,219	10,554	7,000	—con.			
S.W. Africa (d).....	3,603	2,599	1,028	Portugal.....		106	107
Canada.....	135,925	124,307	113,007	Roumania.....	969	1,293	(a)
India.....	79,730	74,785	71,202	U.S.S.R. (Russia)			
Australia (f).....	168,543	150,436	186,356	30) years ended Sept.			
Total.....	398,000	363,000	379,000	Spain.....	10,580	11,000	(a)
FOREIGN COUNTRIES				Sweden.....	121,317	107,899	112,486
Austria.....	6,825	6,020	1,955	Tunis.....	7	24	
Belgium (b).....	84,022	69,731	69,000	Mexico.....	18,900	18,810	13,860
Czechoslovakia.....	4,158	3,601	(a)	United States.....	211,167	204,000	128,000
France.....	19,851	18,800	12,000	Argentina.....	548,537	371,297	248,918
Germany (c).....	133,620	118,420	110,000	Peru.....	8,863	7,493	8,800
Greece.....	7,213	6,601	7,000	French Indo-China...	16,630	3,800	3,600
Hungary.....	69	51	(a)	Brazil (estimated)...	11	6	16
Italy.....	23,956	24,489	30,974	Japan.....	500	700	(a)
Yugoslavia.....	9,889	7,806	8,190	Korea.....	3,524	4,006	4,000
Norway (e).....	787	342	428	Turkey.....	125	93	(a)
Poland.....	39,573	31,372	11,714	Total.....	4,590	1,204	(a)
				World's Total.....	1,650,000	1,350,000	1,170,000

(a) Information not available.

(b) Includes base bullion as follows: 1930, 22,184 long tons; 1931, 13,582 long tons.

(c) Includes some secondary. Figures as published by Metallgesellschaft, which exclude secondary, are: 1930, 109,100 long tons; 1931, 99,700 long tons; 1932, 93,700 long tons.

(d) Years ended March 31, of the year following that stated.

(e) Including tin.

(f) Includes base bullion as follows: 1930, 252 long tons; 1931, 17,130 long tons; 1932, 51,857 long tons.

ZINC

Refined zinc is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company, Limited, from ores mined chiefly in British Columbia; in 1930 a new electrolytic zinc refinery was brought into production at Flin Flon, Manitoba, by the Hudson Bay Mining and Smelting Company, Limited; the plants of both of these companies were in continuous operation throughout 1932.

No primary zinc was produced in 1932 in Nova Scotia, Quebec or Ontario. Manitoba's output came entirely from ores treated at the Flin Flon smelter while in British Columbia some of the principal producers of zinc ores in the order of their output were the Sullivan, Wellington, and Highland Lass.

Figures for the total Canadian production of zinc are compiled by adding the quantities of refined zinc made at Trail and Flin Flon to the amount of zinc estimated as recoverable from ores and concentrates exported; the value of production is usually calculated at the monthly average price for zinc on the London market for the year, exchange conversion being usually made at par. In 1932, using the average monthly rate of exchange, the average value of zinc for the year in Canadian funds was 2.4056 cents per pound.

The total Canadian production of zinc amounting to 172,283,558 pounds in 1932 represents a decrease in quantity of 27.4 per cent from that of the previous year, the valuation of the 1932 output at \$4,144,454 was 31.6 per cent lower than in 1931.

O. W. Roskill states in the Mining Journal, London, that the International Zinc Cartel is one of the few organizations which has something concrete to show as a result of a policy of severe restriction. Stocks have been reduced almost without a break from 204,000 tons at the beginning of August, 1931, when restriction to 55 per cent of the agreed basis was decided upon to 191,194 tons in January, 1932, and 148,597 tons at the end of November, 1932.

Mr. Roskill also remarks in a paper on the "European and World Zinc Situation" that one of the most striking features of the non-ferrous metal industries in 1932 was the intensive competition between various metals and alloys suitable for the same purpose, quite apart from competition with non-metallic materials. Other things being equal, once prejudice and conservatism have been overcome, there is usually a tendency to favour a new material, and the need for the older materials to exercise every effort to maintain their position is of paramount importance. According to Mr. Roskill the average annual increase in production of zinc over the period 1925 to 1930 was 5.9 per cent, whereas the average increase in consumption in this period was about 3.3 per cent.

The American Bureau of Metal Statistics reports the following as the estimated manufacture of zinc by percentage in the United States during 1931 and 1932, for:—

	1931	1932
Galvanizing.....	44.33	40.82
Brass making.....	25.86	24.72
Rolled zinc.....	15.38	17.98
Die castings.....	5.28	6.37
Other purposes.....	9.15	10.11
Total.....	100.00	100.00

Table 79.—Production of Zinc from Canadian Ores, by Provinces, 1923-1932

(For years 1898 to 1922, see 1928 report on the Mineral Production of Canada.)

Year	Quebec		Ontario		Manitoba		British Columbia		Canada	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
1923.....	366,240	24,197					60,050,000	3,967,504	60,416,240	3,991,701
1924.....	2,909,008	184,547					96,000,069	6,090,244	98,909,077	6,274,791
1925.....	9,936,000	757,322	179,545	13,685			99,152,966	7,557,439	109,268,511	8,328,446
1926.....	12,904,176	956,199					137,033,929	10,154,214	149,938,105	11,110,413
1927.....	17,189,046	1,064,690					148,306,479	9,186,103	165,495,525	10,250,793
1928.....	21,057,760	1,156,745	58,724	3,226			163,530,890	8,983,079	184,647,374	10,143,050
1929.....	19,653,440	1,058,731	5,516,806	297,190			172,096,841	9,270,857	197,267,087	10,626,778
1930.....	9,754,160	351,150	3,527,894	127,004	3,882,141	139,757	250,479,310	9,017,255	267,643,505	9,635,166
1931.....					35,173,749	898,338	202,071,702	5,160,911	237,245,451	6,059,249
1932.....					41,736,600	1,004,016	130,546,958	3,140,438	172,283,558	4,144,454

Table 80.—Production of Refined Zinc in Canada, 1923-1932

Year	Short tons	Year	Short tons
1923.....	30,025	1928.....	81,765
1924.....	27,444	1929.....	86,048
1925.....	38,462	1930.....	121,496
1926.....	61,727	1931.....	118,622
1927.....	73,208	1932.....	86,141

NOTE.—For years 1916 to 1922, see previous reports.

Table 81.—Available Statistics on the Consumption of Zinc in Specified Canadian Manufacturing Industries, 1930-1932

Industries	Items (Used)	1930	1931	1932
		Pounds	Pounds	Pounds
Brass and copper products.....	Zinc castings.....	49,000	45,000	1,938,000
Brass and copper products.....	Zinc ingots and bars.....	2,524,000	2,488,000	172,000
Brass and copper products.....	Zinc plates, slabs and sheets.....	103,000	84,000	301,000
Brass and copper products.....	Zinc scrap.....	63,000	39,000	64,000
White metal alloys.....	Zinc spelter.....	178,000	301,000	382,000
White metal alloys.....	Scrap zinc.....	561,000	277,000	485,000
Electrical apparatus.....	Zinc ingots and bars.....	2,669,000	1,586,000	577,000
Electrical apparatus.....	Zinc sheets.....		1,275,000	1,143,000
Iron and steel.....	Zinc.....	25,135,000	19,208,000	16,783,000
Grand Total.....		31,282,000	25,303,000	21,845,000

Table 82.—Imports into Canada and Exports of Zinc and Brass, 1930-1932

	1930		1931		1932	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS		\$		\$		\$
Zinc and Zinc Products—						
Zinc, in blocks, pigs, bars and rods and zinc plates, n.o.p.....	2,588,853	124,128	403,205	12,798	123,476	3,248
Zinc, in sheets and strips and zinc plates for marine boilers.....	6,024,973	410,467	4,138,436	283,261	4,070,523	273,359
Zinc, as spelter.....	1,860,276	90,270	22,378	1,073	66,476	1,897
Zinc white (zinc oxide).....	14,575,729	885,580	11,483,357	641,570	10,112,476	456,861
Zinc dust.....	506,670	37,853	403,001	28,783	530,628	40,623
Zinc, sulphate and chloride of.....	2,685,186	96,242	2,242,204	77,278	2,512,644	76,165
Zinc, manufactures of, n.o.p.....		161,583		122,131		80,261
Lithopone.....	16,051,513	722,341	13,862,914	560,037	16,110,700	585,148
Total.....		2,528,464		1,726,931		1,517,562
Brass and Brass Products—						
Brass, in blocks, pigs and ingots.....	1,391,700	183,829	1,037,300	99,879	74,200	7,177
Brass, scrap.....	1,808,900	206,535	611,100	47,407	48,900	2,193
Brass, tubing not polished, bent or otherwise manufactured in lengths not less than 6 feet.....	3,628,084	766,872	3,036,636	509,151	1,417,023	231,359
Brass, plain wire, n.o.p.....	528,775	127,943	365,363	76,954	242,571	53,929
Brass, bars, rods, coils, not less than 6 feet in length.....	729,700	142,531	400,000	57,852	233,800	34,161
Brass, strips, sheets or plates.....	1,018,400	205,893	578,200	96,297	282,100	48,803
Brass, wire cloth, n.o.p.....		47,027		45,404		25,877
Brass, cups for manufacture of shells.....		119,831		57,135		62,241
Brass, caps for electric batteries.....		7,984		4,973		4,792
Brass, hand-pumps.....		14,627		7,860		2,942
Brass, nails, tacks, etc.....		1,961		1,374		1,621
Brass and copper rivets, burrs and washers.....		73,934		26,288		18,891
Brass valves.....		440,883		286,736		228,090
Brass, other manufactures, n.o.p.....		3,095,430		2,219,055		1,474,103
Carburettors of brass.....		12,536		6,005		2,353
Total.....		5,447,866		3,542,370		2,198,532

Table 82.—Imports into Canada and Exports of Zinc and Brass, 1930-1932—Concluded

	1930		1931		1932	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
EXPORTS						
Zinc—In Ore.....	46,964,100	1,014,915				
Spelter.....	150,964,100	5,146,215	238,018,000	5,554,511	175,321,800	3,852,990
Scrap, dross and ashes.....	4,808,900	92,651	1,093,100	10,018	827,900	9,522
Total.....		6,253,781		5,564,529		3,862,512
Brass—						
Old and scrap dross and ashes.....	6,175,900	485,478	3,724,300	185,392	3,693,400	107,898
Rods, sheets and tubing.....	52,800	13,654	18,200	3,398	11,800	1,620
Valves.....		220,253		161,702		104,367
Mfrs. of brass, n.o.p.....		741,352		554,009		488,771
Total.....		1,460,737		904,501		702,656

Table 83.—Monthly Average Prices of Zinc at Montreal, St. Louis and London, 1930-1932

Month	Montreal ¹ (In cents per pound)			St. Louis ² (In cents per pound)			London ² (In pounds Sterling per long ton)		
	1930	1931	1932	1930	1931	1932	1930	1931	1932
January.....	5.950	4.360	4.063	5.229	4.035	3.011	19.634	12.747	14.416
February.....	5.825	4.230	3.936	5.180	4.012	2.817	19.209	12.303	13.872
March.....	5.550	4.220	3.820	4.934	4.002	2.787	18.304	12.190	12.616
April.....	5.340	3.960	3.634	4.843	3.717	2.725	17.819	11.353	11.670
May.....	5.070	3.660	3.564	4.641	3.306	2.532	16.639	10.484	12.432
June.....	4.990	3.800	3.480	4.441	3.416	2.777	16.422	11.270	11.548
July.....	4.920	3.978	3.355	4.350	3.893	2.537	16.171	12.280	11.592
August.....	4.880	3.786	3.561	4.360	3.817	2.758	15.953	11.444	13.594
September.....	4.830	3.707	3.802	4.270	3.744	3.322	15.773	11.571	15.455
October.....	4.480	3.750	3.667	4.050	3.377	3.027	14.446	12.733	14.869
November.....	4.600	4.014	3.834	4.266	3.209	3.094	14.706	13.845	15.264
December.....	4.570	4.068	3.971	4.099	3.149	3.124	13.762	14.361	15.209
Average.....	5.084	3.961	3.724	4.556	3.640	2.876	16.570	12.215	13.545

¹ Supplied by Consolidated Mining and Smelting Co., Montreal, Que.² From the *Engineering and Mining Journal*.

Converted at par; the average London quotation in cents per pound in 1930 was 3.600 cents per pound.

In 1931, using the par of exchange in London for the first 9 months and the average monthly rate of exchange for each of the remaining three months, the average value of zinc for the year in Canadian funds was 2.554 cents per pound.

The London price zinc, on the basis of which the greater part of the Canadian production is sold, when converted to Canadian funds averaged 2.4056 cents per pound in 1932.

Table 84.—World Metal Production of Zinc, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES— Concluded			
United Kingdom (b).....	48,598	21,241	26,875	Netherlands.....	22,888	19,018	15,377
Northern Rhodesia.....	17,907	6,927	.....	Norway.....	34,064	38,849	38,751
Canada.....	108,479	105,913	76,912	Poland.....	171,608	128,691	83,611
Australia.....	54,901	53,832	53,200	U.S.S.R. (Russia) (years ended Sept. 30).....	4,577	9,364	(a)
Total.....	230,000	188,000	157,000	Spain.....	10,528	9,935	9,751
FOREIGN COUNTRIES				Sweden.....	4,139	92	(a)
Belgium.....	173,447	132,592	97,416	Mexico.....	18,450	34,388	29,800
Czechoslovakia.....	13,259	7,792	(a)	United States (c).....	444,683	260,711	184,954
France.....	85,557	56,200	48,000	French Indo-China.....	3,795	2,836	2,244
Germany (b) (d).....	99,784	47,853	45,000	Japan.....	24,280	25,006	25,000
Italy.....	18,960	16,646	17,700	Total.....	1,140,000	790,000	620,000
Yugoslavia.....	5,418	4,393	2,313	World's Total.....	1,370,000	980,000	780,000

(a) Information not available.

(b) Includes some secondary metal.

(c) The production by grades (including redistilled secondary) was as follows (long tons):—

	1930	1931	1932
A—High grade.....	139,727	74,504	39,460
B—Intermediate grade.....	23,285	21,361	11,871
C and D—Select and brass special.....	83,277	65,423	59,682
E—Prime Western.....	229,510	118,730	87,082
Total secondary zinc recovered.....	113,800	91,100	(a)

(d) The figures published by Metallgesellschaft (which exclude secondary) are (long tons):—

	1930	1931	1932
	95,800	44,600	41,300

Table 85.—World Production of Zinc Ore (In terms of Metal) 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES— Concluded			
United Kingdom.....	647	196	4	Poland.....	118,000	62,000	25,000
Nigeria.....	12	.....	.....	U.S.S.R. (Russia).....	17,700	20,000	(a)
Northern Rhodesia.....	19,477	6,927	.....	Spain.....	48,200	38,000	34,000
Canada (shipments) (b).....	117,726	192,302	96,014	Sweden.....	29,500	28,700	24,156
Newfoundland.....	29,608	49,105	65,403	Algeria.....	7,244	3,137	1,700
India.....	60,700	45,300	41,400	Egypt.....	300	.....	.....
Australia.....	119,613	74,212	115,672	French Morocco.....	405	.....	.....
Total.....	348,000	368,000	318,000	Tunis.....	700	248	.....
FOREIGN COUNTRIES				Mexico.....	140,644	148,155	56,308
Austria.....	3,501	686	1,585	United States.....	531,629	366,355	254,466
Belgium (c).....	4,000	4,000	3,000	Bolivia (exports).....	5,933	14,438	12,763
Czechoslovakia.....	632	1,362	1,592	Chile.....	1	(a)	(a)
Finland.....	443	(a)	740	Peru.....	11,905	(a)	(a)
France.....	8,015	4,281	(a)	China.....	6,000	5,800	4,320
Germany.....	136,463	103,358	74,086	French Indo-China.....	15,600	7,900	5,000
Greece.....	3,637	5,631	7,100	Korea (estimated).....	50	.....	(a)
Hungary.....	480	(a)	(a)	Japan (c).....	10,000	10,000	10,000
Italy.....	78,309	46,348	39,200	Turkey (estimated).....	2,900	1,000	1,600
Yugoslavia.....	13,300	26,900	46,061	New Caledonia.....	1,000	.....	(a)
Norway.....	7,509	7,310	8,734	Total.....	1,200,000	880,000	640,000
				World's Total.....	1,550,000	1,250,000	960,000

(a) Information not available.

(b) The amount estimated as recoverable was—

1930.....	119,484 long tons
1931.....	105,913 "
1932.....	76,912 "

(c) Metallgesellschaft estimate.

CHAPTER FOUR

THE NICKEL-COPPER INDUSTRY IN CANADA

1. General Review.
2. Commodity statistics including tables showing production by provinces, imports, exports, prices and world output of nickel, copper and metals of the platinum group.

1. General Review

(a) **Definition of the Industry.**—The nickel-copper industry in Canada includes the mining, smelting and to a certain extent, the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., Kristiansand, Norway, and Clydach, Wales.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 15 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production and trade statistics on nickel, copper and the metals of the platinum group are given in this chapter.

(b) **Historical.**—Construction of railways in Canada has resulted in the discovery of some valuable mineral deposits. One of these was the finding of the nickel-copper ores of the Sudbury area during the building of the Canadian Pacific Railroad in 1883. The first of these ore bodies was mined for copper in 1886 and it was not until 1887 that the presence of nickel was detected. Almost coincident with these discoveries occurred the introduction of nickel in the manufacture of special steels. This stimulated an almost continuous growth in the industry, a growth which has firmly established Canada as the premier nickel producing nation of the world.

For many years the principal use for nickel was in the manufacture of war material, especially in armour plate; this particular consumption of the metal reached its maximum during the late World War. Following the cessation of hostilities the demand for nickel was greatly reduced and it was largely by intensive research that new uses for the metal were developed and production re-established on a firmer and broader basis. The almost universal industrial expansion of the past decade was largely responsible for the high record production of 110,275,912 pounds of nickel from Canadian mines in 1929. Production of the metal has since declined, sharply reflecting the general and severe economic depression of 1930, 1931 and 1932.

(c) **Importance of Nickel, Copper and Platinum Group Metals.**—Canada supplies about 90 per cent of the world's nickel requirements, the remainder being obtained largely from New Caledonia. A small amount of nickel is recovered from the silver-cobalt ores of the Cobalt district, most of the Canadian nickel output is, however, produced from the ores of the Sudbury area.

Copper produced from the nickel-copper ores in Ontario constitutes about 31 per cent of the total copper obtained from all Canadian ores. British Columbia, mining and smelting copper and copper-gold ores, produces approximately 20 per cent of Canada's copper output. Quebec supplies 27 per cent and the Manitoba production accounts for 21 per cent.

As a world producer of copper in 1932 Canada ranks second; the United States is the leading copper producing country followed, according to importance, by Canada, Chile, Northern Rhodesia, Japan and Belgian Congo. Until within the last three years the amount of refined copper

produced in Canada had been relatively small; previously it was found more profitable to ship blister copper or copper in matte or in concentrates to foreign metallurgical plants for conversion to refined metal. An increase in the Canadian demand for electrolytic copper may be expected as a phase of future industrial expansion and the output of refined copper from the two new Canadian refineries should increase proportionately with the return of normal business conditions.

Some gold and silver, together with metals of the platinum group, including, in addition to platinum, the associated metals, palladium, rhodium, osmium and iridium, are present in varying amounts in the ores of the Sudbury district. The amounts of these metals in the different Sudbury nickel deposits vary considerably and their recovery has been a factor of growing importance in the metallurgical treatment of the nickel ores.

At the present time Canada produces a very considerable proportion of the world's supply of platinum; recovery of most of this metal is carried out in refineries operating outside the confines of the Dominion.

Sales of Falconbridge Nickel aggregated 7,844,648 pounds in 1932 and copper was sold practically as produced, the company's cathodes having met with acceptance in Scandinavia particularly.

Sales by the International Nickel Company of nickel in all forms, including nickel in alloys, amounted to 34,406,953 pounds in 1932 compared with 55,739,047 pounds in 1931, a decrease of 38 per cent. The world's consumption of nickel in all forms aggregated 57,000,000 pounds as against 73,000,000 pounds in 1931 and 88,000,000 pounds in 1930.

(d) **Mining, Smelting and Refining.**—Practically all of the nickel produced in Canada comes from the copper-nickel bearing deposits of the Sudbury district, Ontario. Two companies operate mines and metallurgical plants in this area. The International Nickel Company of Canada, Ltd., conducts smelting operations at Copper Cliff and Coniston, Ontario, while Falconbridge Nickel Mines Ltd., smelts its ores at the Falconbridge mine located a few miles east of the town of Sudbury. This company ships its matte to Norway for refining in its plant at Kristiansand. The nickel oxide produced at Deloro, Ontario, is recovered from silver-cobalt-nickel-arsenic ores mined in Northern Ontario.

Smelter matte made by the International Nickel Company is treated at plants located at Clydach, Wales; Huntington, West Virginia, U.S.A., and at Port Colborne, Ontario. During 1932 the company mined a total of 666,468 tons of ore, comprising Frood mine, 513,590 tons; Creighton mine, 96,850 tons; and Garson mine, 56,028 tons. Frood mine development to date, including shafts, drifts, crosscuts, raises, winzes and box holes, aggregates 137,515 feet or approximately twenty-six miles. During 1932, 10,337 feet of this total were accomplished. There are now sixty-eight stopes prepared in this mine to yield 150 tons per day per stope. The Creighton and Garson mines were operated at minimum capacity during the first seven months and were inactive during the remainder of the year. Conforming to the policy of curtailment, development work in all mines was restricted and exploratory work entirely suspended. Mill operations were greatly curtailed at Copper Cliff in 1932, there being only 579,640 tons of ore milled. Definite metallurgical advances were made however and experimental work continued. Three reverberatory furnaces were operated until the end of March after which two furnaces were used for the balance of the year. The smelter treated 336,215 tons of dry concentrates and produced 27,033 tons of bessemer matte and 27,770 tons of blister copper. The Orford process plant was started here in March, 1932, and ran intermittently as required. This plant treated 11,370 tons of bessemer matte and produced 6,651 tons of matte for refining at Port Colborne and 2,249 tons of blister copper. The Coniston smelter after operating from January to July was closed for the rest of the year. During its period of operation 90,606 tons of ore were smelted and 9,679 tons of bessemer matte produced. At the Port Colborne refinery two electrolytic units operated from January 1st until August 1st when operations were suspended. The refinery produced 14,125,388 pounds of nickel in the form of electrolytic cathodes and nickel in oxide. The output of nickel at the Clydach refinery was 7,416,464 pounds compared with 16,546,740 pounds for 1931, a decrease of 55 per cent. The plant operated continuously on a reduced scale for the first six months of the year, the pellet nickel department being closed from July 1st until

the middle of December when operations were resumed. Owing to the reduced scale of operations at Port Colborne and Clydach the supply of precious metals concentrates which form the raw material for the company's refinery at Acton, England, was greatly reduced entailing a corresponding reduction in the output of platinum and palladium. Platinum production was 26,213 ounces compared with 44,725 ounces for 1931 and the output of palladium fell from 39,313 ounces in 1931 to 29,496 ounces in 1932. Operations by Henry Wiggin & Co. Ltd., England (a subsidiary of the Mond Nickel Co. Ltd.) and including since October, 1932, the business formerly carried on by Monel-Weir Ltd., were on a substantially increased scale over 1931, the nickel contained in all sales showing an increase of 17 per cent. The wire department was kept busy throughout the year and the spoon and fork department production increased fifty per cent over 1931. Owing to tariff and currency changes an increasing amount of "monel metal" was produced by this firm to supply the British home and colonial market, and to a more limited extent, the continental market. Birmingham Electric Furnaces Ltd. (a subsidiary of the Mond Nickel Co. Ltd., England) report that its works was again extended in order to care for an increased volume of business. Sales for 1932 were greatly in excess of those in 1931 and were nearly equal to those for the years 1929, 1930 and 1931 combined. The operations of this company returned a net profit for the year in addition to creating a demand for the nickel products of Henry Wiggin & Co. Ltd. The Huntingdon works of the International Nickel Co. Ltd. operated continuously in the United States during 1932 at a rate approximately 65 per cent of that for the preceding year, consequent upon the acquisition of Monel-Weir Ltd., this works produced an increasing amount of semi-finished "monel metal" (ingots, blooms, etc.) for finishing in the works of Henry Wiggin & Co. Ltd., England. The total number of employees of the International Nickel Co. of Canada and its subsidiaries on December 31, 1932, was 4,342 distributed as follows: Canada, 1,402; Great Britain, 2,086; the United States, 813; other countries, 41. Proven ore reserves of the company as at December 31, 1932, were 203,909,973 tons. Because of this adequate tonnage of available ore the company deemed it unnecessary to carry on other than a minimum of development work.

Falconbridge Nickel Mines, Ltd., reports that ore reserves had increased to 2.9 million tons averaging 2.25 per cent nickel and 0.93 per cent copper. Of this tonnage over two million lie above the present bottom of the mine (1,000 feet) and promise approximately eleven years life at the rate of 200,000 tons per year. The remainder of the reserve tonnage lies beneath the 1,000 foot level and was intersected by diamond drilling; present workings cover but a fraction of the company's holdings known to be ore-bearing.

The company reports 144,090 tons of ore hoisted from stopes and 15,483 tons from development, or a total of 159,573 tons. The smelter was in operation a total of 341 days during the year. Results tabulate as follows:—

Ore smelted.....	tons	123,306
Matte produced.....	tons	4,947.6
Nickel produced in matte.....	tons	2,908.17
Copper produced in matte.....	tons	1,196.63
Metals per ton in ore—		
Nickel.....	pounds	50.17
Copper.....	pounds	20.91
Metallurgical losses per ton of ore—		
Nickel.....	pounds	3.0
Copper.....	pounds	1.5

Satisfactory progress was made on the construction of a 250 ton concentrator, sintering plant, smelter extension and the necessary additions to the crushing plant and ore bins that would be required to synchronize these units to effect increased capacity. The smelter operated with the normal minor interruptions throughout the year, with the exception of an eleven day shutdown in December to lengthen the blast furnace. The refinery in Norway operated satisfactorily without any close down during the year and with a somewhat increased production which during the last months of 1932 reached nine metric tons daily. The department for

concentrating of precious metal slimes was working regularly during the year and shipments of concentrated slimes took place at suitable intervals; at the end of the year construction was advanced for increasing the capacity of the refinery by 1,000 metric tons annually. For the year 1932 the amount of matte received from the smelter, the refinery production, the metals in process and the matte on hand at the end of the year are set out in the following table:—

	Short ton	Contents	
		Nickel	Copper
		Pound	Pound
Falconbridge matte received less refinery losses.....	4,859.6	5,527,518	2,236,299
Produced in marketable form during the year.....		5,408,373	2,288,897
Metals in process at end of year.....		1,208,104	334,958
Matte on hand at end of year.....	22,707	26,077	11,676

B.C. Nickel Mines Ltd., reported only surface and other assessment work for 1932 on its nickel-bearing deposits located at Choate, British Columbia.

Table 86.—Capital Employed in the Nickel-Copper Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
Capital employed as represented by:—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment—		
Mines.....	20,834,771	22,683,112
Smelters and refinery.....	43,417,737	44,633,188
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	10,961,881	10,286,822
(c) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	1,488,559	585,082
Total.....	76,702,948	78,188,204

Table 87.—Output from Nickel-Copper Mines and Smelters in Canada, 1931 and 1932

		1931	1932
Ore mined.....	tons	1,714,075	826,041
Ore shipped.....	tons	1,689,874	790,614
Content of ores, etc., shipped:—			
Copper.....	lb.	123,641,190	92,144,651
Nickel.....	lb.	89,424,886	39,001,127
Ores and concentrates treated at smelters.....	tons	1,884,959	793,552
Matte produced.....	tons	100,273	41,660
Content of matte:—			
Copper.....	lb.	77,621,143	32,353,240
Nickel.....	lb.	81,285,931	33,871,440
Matte shipped to Canadian refineries.....	tons	68,076	6,651
Matte exported to Foreign smelters.....	tons	30,294	21,778

Table 88.—Proportion of Nickel and Copper in Sudbury Matte, 1923-1932

Year	Percentage			Year	Percentage		
	Nickel	Copper	Total		Nickel	Copper	Total
1923.....	53.4	27.2	80.6	1928.....	47.6	32.6	80.2
1924.....	52.6	27.9	80.5	1929.....	44.0	35.1	79.1
1925.....	52.1	27.9	80.0	1930.....	36.6	42.5	79.1
1926.....	49.6	30.6	80.2	1931.....	40.5	38.7	79.2
1927.....	48.4	31.7	80.1	1932.....	40.7	38.4	79.1

NOTE.—For years 1912 to 1922 see previous reports.

Table 89.—Employees, Salaries and Wages, in the Nickel-Copper Industry in Canada, 1931 and 1932

	1931				1932			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees—								
Mine and mill.....	41		41	170,155	43		43	153,109
Smelters and refinery.....	139	14	153	546,069	132	13	145	453,387
Total.....	180	14	194	716,224	175	13	188	611,496
Wage-earners—								
Mine and mill.....	2,092		2,092	2,980,085	1,167		1,167	1,623,081
Smelters and refinery.....	2,014		2,014	3,308,094	1,051		1,051	1,686,018
Total.....	4,106		4,106	6,288,179	2,218		2,218	3,309,099
Grand total.....	4,286	14	4,300	7,004,403	2,393	13	2,406	3,920,595

NICKEL

Production figures include nickel in matte or speiss exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides or salts sold, valued in the aggregate at the sum obtained from the sales of oxides or salts.

Table 90.—Production of Nickel from Canadian Ores, 1923-1932

(For years 1899 to 1922 see 1923 report on the Mineral Production of Canada)

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
		\$			\$
1923.....	62,453,843	18,332,077	1928.....	96,755,578	22,318,907
1924.....	69,536,350	19,470,178	1929.....	110,275,912	27,115,461
1925.....	73,857,114	15,946,672	1930.....	103,768,857	24,455,133
1926.....	65,714,294	14,374,163	1931.....	65,666,320	15,267,453
1927.....	66,798,717	15,262,171	1932.....	30,327,968	7,179,862

Table 91.—Production of Canada, Imports and Exports of Nickel, 1930-1932

	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$	Pounds	\$
PRODUCTION—						
Nickel in matte and speiss exported, refined and electrolytic nickel produced, and nickel in oxides and salts sold.....	103,768,857	24,455,133	65,666,320	15,267,453	30,327,968	7,179,862
IMPORTS—						
Nickel, nickel silver and German silver, in ingots or blocks, n.o.p.....	37,462	9,250	36,001	5,318	7,364	2,179
Nickel in bars and rods, strips, sheets and plates.....	1,120,122	347,461	616,027	228,435	452,781	172,446
Nickel silver and German silver, in bars, rods, strips, sheets, plates or anodes....	180,122	69,664	85,708	26,558	37,218	12,585
Nickel chromium, in bars and rods.....	44,344	44,434	44,111	45,033	41,434	46,443
German, Nevada and nickel silver, manufactures of, not plated.....		471,036		229,412		160,798
Nickel-plated household hollow-ware.....		18,401		13,213		12,915
Nickel kitchenware.....		2,261		2,597		825
Nickel-plated ware, n.o.p.....		2,004,398		1,185,115		845,734
Total nickel and its products.....		2,966,905		1,735,681		1,253,925
EXPORTS—						
Nickel, fine.....	43,122,500	11,262,512	27,132,700	7,140,420	15,165,500	4,022,748
Nickel contained in matte.....	44,890,400	8,142,794	33,287,600	6,048,508	15,169,200	2,757,713
Nickel in oxide.....	3,733,000	1,100,018	3,108,300	992,637	1,737,200	503,503
Total.....	91,745,900	20,505,324	63,528,600	14,181,565	32,071,900	7,283,964

Table 92.—World Production of Nickel Ore, 1930-1932

(In terms of metal)

(Supplied by the *Imperial Institute*)

(Long tons)

Country	1930	1931	1932
British Empire—			
Canada.....	46,325	29,315	13,539
India (b).....	951	804	713
Australia.....	118	(1 cwt.)	(11 cwt.)
Foreign countries—			
Greece.....		638	(a)
Norway.....	862	523	959
United States (d).....	275	333	174
New Caledonia (c).....	4,800	3,800	2,600
World's Total.....	53,300	35,400	18,600

(a) Information not available.

(b) Nickel content of speiss obtained as a by-product in smelting operations.

(c) Estimated content of matte and ferro-nickel obtained at smelters. Content of ores mined was as follows:—

1931..... 7,318 long tons

1932..... 4,958 "

(d) Nickel content of salts and nickel produced as a by-product in the electrolytic refining of copper (partly from imported blister copper).

COPPER

CANADA

Copper production includes copper contained in ores and concentrates exported, copper in blister copper made, in matte exported and in any primary copper sulphate shipped during the year. Statistics show a production in 1932 of 247,679,070 pounds valued at \$15,294,058 as compared with 292,304,390 pounds worth \$24,114,065 in 1931 and 303,478,356 pounds at \$37,948,359 in 1930.

Copper production in Quebec, in 1932, came from the metal contained in concentrates exported from Eustis by the Consolidated Copper and Sulphur Co. Ltd., and the metal contained in blister or anode copper produced by Noranda Mines Ltd. The latter company increased gold production and decreased copper production owing to the unprecedented low prices of copper. Early in 1932 operations at the Waite-Ackerman-Montgomery Mines, the controlling share interest of which is held by Noranda, ceased and it is expected the mine will remain closed until copper prices materially increase. During 1932 Noranda smelter treated 918,567 tons of ore, concentrates and refinery slag and produced 63,422,518 pounds of anodes, the average analysis of which was 99.36 per cent copper, 10.76 oz. gold and 19.54 oz. silver per ton. The Montreal East refinery of Canadian Copper Refiners, a subsidiary of Noranda, was in continuous operation throughout the year producing electrolytic copper from primary metal recovered in Quebec and Manitoba, scrap copper was also treated in this plant. The precious metal division of the refinery was being doubled in 1932 in order to expedite the handling of the precious metals input. Canada Wire and Cable Company, allied to Noranda Mines, operates a rolling mill and wire drawing plant adjacent to the Montreal East refinery. This works produces round rods, drawn copper for shaped or round trolley wire and a wide range of cables and wires.

Copper production in Ontario during 1932 came almost entirely from the copper nickel deposits of the Sudbury district. The Copper Cliff smelter of the International Nickel Company of Canada, Ltd., treated 336,215 tons of dry concentrates and produced 27,033 tons of bessemer matte and 27,770 tons of blister copper. The new Orford process plant started in March and produced 2,249 tons of blister copper; the Coniston smelter of the same company reported an output of 9,679 tons of bessemer matte for the year. In consequence of the reduced rate of world consumption of copper the refinery of the Ontario Refining Co. Ltd. (associated with

International Nickel Co.) located at Copper Cliff, operated throughout the year at a greatly reduced rate even as compared with that of 1931. Nevertheless it was possible to hold the cost of copper refining at a level only slightly above that of 1931. Refined copper was shipped from the refinery to practically all copper consuming countries. Falconbridge Nickel Mines Ltd. reported its smelter in operation 341 days during the year; 123,306 tons of ore were smelted and 4,947.6 tons of matte produced. The company states that its Norwegian refinery operated satisfactorily without close down during the year and with a somewhat increased production. For the year 1932 the amount of copper produced in marketable form totalled 2,288,897 pounds with 334,958 pounds in process at end of year. The new replacement rolling mill erected at Brockville, Ontario, by the Eugene F. Phillips Electrical Works Ltd., was placed in operation at the beginning of 1932; the mill itself consists of three main units, a roughing mill, an intermediate mill, and a finishing mill (all machines are motor driven). It is interesting to note that negotiations concluded in 1931 by this company have resulted in the production of asbestos-insulated wires and cables in a new works located at Montreal. Copper products manufactured by the Eugene F. Phillips Electrical Works include electrolytic copper rods, power cables, flexible armoured cables and a variety of other copper manufactures.

Copper is also rolled in mills operated at New Toronto by the Anaconda American Brass Ltd. This company manufactures copper plates, rods, sheets, etc.

The Hudson Bay Mining and Smelting Co. Ltd., conducting mining and smelting operations at Flin Flon, Manitoba, mined and milled 1,439,651 tons of ore averaging .085 ounces of gold, 1.13 ounces of silver, 1.98 per cent copper and 3.7 per cent zinc, and from this ore produced 82,565 ounces of gold, 933,983 ounces of silver and 42,158,235 pounds of copper and 41,736,000 pounds of zinc. The copper smelter of the company operated continuously during the year. There were smelted in the reverberatory furnace in 1932, 241,432 tons of Flin Flon ore and concentrates; in addition 23,711 tons of custom ore and concentrates were smelted, all of the company's production for the year was sold. Sherritt-Gordon Mines Ltd., operating at Sherridon, Manitoba, decided that with the steady drop in the price of copper the mine be shut down until a better price for copper be obtained. In accordance with this decision all operations ceased in June, 1932. During the six months 9,929,182 pounds of electrolytic copper were produced at a cost of 6.195 cents per pound after crediting 0.893 cents for gold and silver values. Sherritt-Gordon concentrates were smelted by the Hudson Bay Mining and Smelting Company and the resultant blister was treated by the Ontario Refining Company.

In British Columbia all sales of copper from Britannia Mining and Smelting Co. Ltd., were suspended early in March, 1932, because of the marked decline in the price of the metal and thereafter all mine operations were curtailed. Due to the import duty of 4 cents per pound on copper, included in the United States Revenue law effective June 21, 1932, the copper thereafter produced at Britannia, when sold, must be marketed abroad and arrangements for such disposal of the production have been perfected on a basis which it is believed will be as satisfactory in operation as that governing the company's sales of lead and zinc produced in Mexico.

Continuous operations were conducted by the Granby Consolidated Mining, Smelting and Power Co. in the Hidden Creek and Bonanza mines at Anyox, B.C. Milling of about 5,000 tons a day was maintained or about the same as in 1931. The United States copper tariff and low copper prices necessitated curtailment of the usual shipments. However, metallurgical innovation made possible the shipment of about 300 tons of high grade gold-copper blister per month. The usual grade blister-copper was stored awaiting an improvement in copper price. Production shows a slight increase in copper and a slight decrease in gold and silver as compared with 1931 but with the bulk of the 1932 production not marketed.

In no previous year has the price of copper been so low as in 1932; the average for the year in New York was 5.555 cents per pound; the price ranged from 7.060 cents in January to 4.813 cents in December. In January the London price of copper was 46.200 pounds sterling per long ton; the low point was reached in July when the price for the month averaged 29.107. The September quotation stood at 38.318 which fell to 34.344 in December. The average price of copper in London for the year, transposed to Canadian funds, was 6.3802 cents per pound.

Table 93.—Production of Copper from Canadian Ores, 1923-1932

Year	Pounds	Value	Cents per pound	Year	Pounds	Value	Cents per pound
		\$				\$	
1923.....	86,881,537	12,529,186	14.421	1928.....	202,696,046	28,598,249	*
1924.....	104,457,447	13,604,538	13.024	1929.....	248,120,760	43,415,251	*
1925.....	111,450,518	15,619,882	14.042	1930.....	303,478,356	37,948,359	*
1926.....	133,094,942	17,490,300	*	1931.....	292,304,390	24,114,065	*
1927.....	140,147,440	17,195,487	*	1932.....	247,679,070	15,294,058	*

* Since 1926 the value of Canada's copper production was computed according to the note on page 234.

NOTE.—For years 1886 to 1922, see previous reports.

Table 94.—Production of Copper in Canada, by Provinces and by Sources, 1931 and 1932

Production	1931		1932	
	Pounds	Value	Pounds	Value
		\$		\$
By PROVINCES—				
Quebec.....	68,376,985	5,723,154	67,336,692	4,296,216
Ontario.....	112,882,625	9,096,463	77,055,413	4,407,928
Manitoba.....	45,821,432	3,835,254	52,706,861	3,362,803
British Columbia.....	65,223,348	5,459,194	50,580,104	3,227,111
Total.....	292,304,390	24,114,065	247,679,070	15,294,058
By SOURCES—				
In blister copper produced.....	243,805,331	20,434,685	211,005,663	13,462,583
In ores, concentrates and copper matte exported.....	35,258,939	2,951,174	19,023,221	1,213,719
In nickel-copper matte exported.....	13,240,120	728,206	17,650,186	617,756
Total.....	292,304,390	24,114,065	247,679,070	15,294,058

Table 95.—Production of Refined Copper in Canada, 1923-1932

Year	Tons	Year	Tons
1923.....	824	1928.....	8,806
1924.....	1,768	1929.....	3,518
1925.....	170	1930.....	31,377
1926.....	10,581	1931.....	92,183
1927.....	9,191	1932.....	90,077

NOTE.—For years 1916 to 1922 see previous reports.

Table 96.—Production of Copper Sulphate in Canada, 1923-1932

Year	Pounds	Year	Pounds
1923.....	307,135	1928.....	771,400
1924.....	127,301	1929.....	617,430
1925.....	121,746	1930.....	734,300
1926.....	404,862	1931.....	62,140
1927.....	566,825	1932.....	*900,220

* Used by producer.

Table 97.—Quantity and Value of Copper Produced in Canada, by Provinces, 1923-1932

(For production in previous years see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Manitoba		British Columbia		Yukon	
	lb.	\$	lb.	\$	lb.	\$	lb.	\$	lb.	\$
1923.....			31,656,800	4,565,227			55,224,737	7,963,959		
1924.....	1,893,006	246,546	37,113,193	4,833,622			65,451,246	8,524,370		
1925.....	2,510,141	352,474	39,718,777	5,577,311			69,221,600	9,720,097		
1926.....	2,674,058	368,886	41,312,867	4,828,964			89,108,017	12,292,450		
1927.....	3,119,848	403,084	45,341,295	4,946,533			91,686,297	11,845,870		
1928.....	33,697,949	4,909,791	66,607,510	8,770,149			102,283,210	14,902,664	*107,377	15,645
1929.....	55,337,169	10,019,901	88,879,853	14,622,572			103,903,738	18,772,778		
1930.....	80,310,363	10,425,891	127,718,871	15,187,259	2,087,609	215,018	93,318,885	12,114,657	42,628	5,594
1931.....	68,376,985	5,723,154	112,882,625	9,096,463	45,821,432	3,835,254	65,223,348	5,459,194		
1932.....	67,336,692	4,296,216	77,055,413	4,407,928	52,706,861	3,362,803	50,580,104	3,227,111		

* Includes small quantities produced in 1925, 1926 and 1927 but not reported until 1928.

Table 98.—Available Statistics on the Consumption of Copper in Specified Canadian Manufacturing Industries, 1930-1932

Industries	Items (Used)	1930	1931	1932
		Pounds	Pounds	Pounds
*Brass and Copper Products.....	Copper castings, ingots and bars.....	36,736,000	28,212,000	13,482,000
Brass and Copper Products.....	Copper plates, slabs and sheets.....	676,000	211,000	339,000
Brass and Copper Products.....	Pipe.....	437,000	129,000	89,000
Brass and Copper Products.....	Rods.....	42,000	518,000	12,000
Brass and Copper Products.....	Tubing.....		47,000	45,000
Brass and Copper Products.....	Wire.....	1,323,000	309,000	1,065,000
Brass and Copper Products.....	Scrap.....	3,012,000	3,394,000	2,058,000
White Metal Alloys.....	Scrap copper.....	1,759,000	919,000	1,337,000
White Metal Alloys.....	Copper bars, etc.....		48,000	31,000
Electrical Apparatus.....	Pig and scrap.....	1,587,000	438,000	224,000
Electrical Apparatus.....	Rods and bars.....		32,840,000	45,405,000
Electrical Apparatus.....	Tubes.....		201,000	278,000
Electrical Apparatus.....	Pipe.....	63,012,000	2,000	4,000
Electrical Apparatus.....	Sheets.....		310,000	191,000
Electrical Apparatus.....	Wire.....		7,624,000	4,239,000
Iron and Steel.....	Copper.....	7,269,000	3,524,000	2,797,000
Grand Total.....		115,853,000	78,726,000	71,596,000

* A relatively large part of the copper included under this industry is rolled into wire rods, which are sold to manufacturers of electrical wire and cable and duplication to this extent results from the inclusion of these rods in the electrical apparatus industry.

Table 99.—Imports into Canada and Exports of Copper, 1930-1932

	1930		1931		1932	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS—		\$		\$		\$
Copper in bars or rods, when imported by manufacturers of trolley, telegraph and telephone wires, electric wires and electric cables for use only in the manufacture of such articles in their own factories, also copper bars for use only in the manufacture of rods to be used exclusively in the manufacture of electrical conductors and copper rods for such manufacture, the individual units of such electrical conductors not exceeding the area of No. 7-0 gauge conductor.....	30,906,700	4,368,678	9,339,200	960,190	466,400	50,604
Copper in bars or rods, in lengths of not less than 6 feet, unmanufactured.....	1,595,900	305,381	348,200	52,552	169,200	26,471
Copper in blocks, pigs or ingots.....	7,867,200	1,022,936	965,500	97,526	264,000	18,366
Copper, scrap; cathode plates for melting.....	1,443,700	173,114	753,400	73,289	9,800	627
Copper, in strips, sheets or plates, not polished or coated.....	1,844,700	410,565	1,074,600	181,782	286,500	49,578
Copper tubing in lengths of not less than 6 feet, and not polished, bent or otherwise manufactured.....	1,895,872	442,842	1,874,087	353,685	1,135,966	209,165
Copper wire, n.o.p.....	722,729	178,299	144,125	30,961	44,526	7,804
Copper wire cloth, or woven wire of copper.....		9,509		7,947		3,416
Copper wire, single or several, covered with cotton, linen, silk, rubber or other material, including cable so covered.....		557,027		85,094		
Copper, all other, manufactures of, n.o.p.....		767,960		482,919		350,422
Copper, precipitate of, crude.....			9,237	1,239	20,303	1,749
Anodes of nickel, zinc, copper, silver or gold.....		9,745		4,377		2,737
Copper, sub-acetate of, or verdigris, dry.....	7,528	1,323	2,081	586	2,209	318
Copper, sulphate of, including dehydrated, for agricultural or spraying purposes.....	6,016,579	273,842	5,231,723	210,328	5,174,057	164,693
Copper rollers adapted for use in calico printing.....		81,406		87,965		59,066
Total.....		8,602,627		2,630,440		945,016
EXPORTS—						
Copper, fine, contained in ore, matte regulus, etc.....	74,804,600	7,236,456	48,761,200	3,891,045	37,964,900	1,915,096
Copper, blister.....	147,521,400	22,428,176	37,697,700	3,597,146	21,994,500	1,233,090
Copper, old and scrap.....	6,765,600	740,099	5,127,000	298,228	5,887,600	269,118
Copper in bars, rods, strips, sheets, plates and tubing*.....	6,959,200	827,944	105,203,200	9,278,441	62,346,700	4,673,447
Copper wire and cable, insulated.....		111,678		52,463		134,932
Copper mfrs., n.o.p.....		10,191		38,390		25,252
†Copper in ingots, cakes, slabs, and billets.....					119,060,000	6,795,591
†Copper in rods, strips, sheets, plates and tubing.....					19,516,900	1,185,102
Total.....		31,354,544		17,155,713		16,231,628

* From January 1 to March 31, 1932.

† From April 1 to December 31, 1932.

Table 100.—Monthly Average Prices of Copper (Electrolytic), New York and London, 1930-1932

(From the *Engineering and Mining Journal*)

	New York (In cents per pound)			London (£ Sterling per long ton)		
	1930	1931	1932	1930	1931	1932
January.....	17.775	9.938	7.060	83.250	47.524	46.200
February.....	17.775	9.724	5.965	83.500	47.950	41.381
March.....	17.775	9.854	5.763	83.405	47.699	36.786
April.....	15.621	9.392	5.565	74.338	45.375	34.190
May.....	12.756	8.665	5.237	59.545	42.175	32.833
June.....	12.049	8.025	5.145	56.750	38.966	30.841
July.....	11.023	7.698	5.053	52.522	37.293	29.107
August.....	10.693	7.292	5.219	50.725	35.388	34.784
September.....	10.310	6.988	5.978	49.500	36.148	38.318
October.....	9.597	6.775	5.733	45.772	41.000	36.190
November.....	10.113	6.558	5.131	48.963	41.190	36.568
December.....	10.300	6.580	4.813	50.065	44.409	34.344
Average.....	12.982	8.116	5.555	61.528	42.093	35.962

Using the par of exchange in New York for the first 9 months of 1931 and the average monthly rate of exchange for each of the last three months the average value of copper in Canadian funds for the year was 8.370 cents per pound. The average price of copper in London for 1932, transposed to Canadian funds, was 6.3802 cents per pound.

Table 101.—World Production of Copper Ore, 1930-1932

(In terms of metal)

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	48	66	61	Portugal (estimated)	4,000	3,000	2,000
N. Rhodesia.....	8,494	32,403	87,239	Roumania.....	137	21	(a)
S. Rhodesia (smelter)	1,313	530	5	Russia (estimated)...	33,600	30,600	31,500
South West Africa (c)	14,900	8,300	2,400	Spain.....	62,000	53,000	34,000
Union of South Africa	8,491	10,045	9,254	Sweden.....	794	8,407	3,300
Canada.....	135,481	130,493	110,571	Algeria.....	1	.....	.....
Cyprus.....	5,100	3,800	3,200	Belgian Congo	.....	.....	.....
India (estimated)....	11,600	11,500	11,200	(smelter).....	136,754	118,000	53,000
Australia.....	12,984	13,532	14,658	French Equatorial	.....	.....	.....
Newfoundland.....	800	1,400	2,000	Africa.....	600	80	(a)
Total.....	199,000	212,000	241,000	French West Africa.	133	200	.....
				Cuba.....	13,790	13,293	5,833
				Mexico (b).....	72,252	53,355	34,698
				United States (b)...	629,530	472,210	214,278
				Bolivia (exports)....	3,924	2,016	1,985
				Chile.....	252,379	221,000	101,600
				Peru.....	47,513	43,623	22,529
				Formosa.....	4,100	4,000	3,400
				China (estimated)...	10	12	(a)
				Japan (smelter).....	77,785	74,650	69,891
				Korea (smelter).....	571	674	(a)
				Turkey.....	.....	61	.....
				New Caledonia.....	50	.....	.....
				Total.....	1,420,000	1,170,000	660,000
				World's Total....	1,620,000	1,380,000	900,000

(a) Information not available.

(b) Amount estimated as recoverable.

(c) Years ended March 31 of the year following that stated.

Table 102.—World Metal Production of Copper, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom (estimated).....	18,000	16,000	13,000	—concluded			
Northern Rhodesia...	6,269	8,927	67,887	Yugoslavia.....	24,077	23,917	29,683
Southern Rhodesia...	1,313	530	6	Norway.....	5,068	4,283	5,330
Union of South Africa...	7,370	10,063	9,239	Roumania.....	167		(a)
Canada (d).....	99,951	108,841	94,199	Russia (years ended 30th Sept.).....	46,700	48,000	(a)
India.....	2,974	4,069	4,443	Spain.....	22,632	25,327	14,142
Australia.....	14,900	12,936	13,307	Sweden.....	5,697	2,958	3,088
Total.....	151,000	161,000	202,000	Belgian Congo (e)...	136,754	118,000	53,000
FOREIGN COUNTRIES				Mexico.....	55,508	42,000	33,500
Austria.....	4,012	3,184	1,956	United States.....	718,088	528,691	274,591
Belgium.....	14,409	30,904	(a)	Chile.....	204,281	211,849	95,976
Czechoslovakia.....	1,497	1,196	(a)	Peru.....	44,943	43,000	20,000
France (c).....	1,645	1,053	(a)	China (exports).....	1,184	155	16
Germany (b).....	58,300	54,600	50,100	Hungary.....			274
Italy.....	258	710	420	Japan.....	77,785	74,650	69,793
				Korea.....	571	674	(a)
				Total.....	1,430,000	1,220,000	730,000
				World's Total...	1,580,000	1,380,000	930,000

(a) Information not available.

(b) Metallgesellschaft figures.

(c) Includes some matte.

(d) Copper content of blister copper.

(e) The figure for 1930 is in terms of blister copper; those for later years refer to fine copper.

METALS OF THE PLATINUM GROUP

Production of Canadian platinum metals comes almost entirely from the copper-nickel ores of the Sudbury district in Ontario. Small quantities of these metals are also obtained in alluvial gold mining operations in British Columbia. The British Columbia Department of Mines reports that during 1932 continued interest was shown in the search for gold and platinum on the Tulameen and Similkameen rivers, as well as on Granite Creek and adjacent streams, and many small lots of these metals were recovered from different locations.

International Nickel Company of Canada, Ltd., report sales of platinum metals at 19,300 ounces in 1932. Owing to the reduced scale of operations at Port Colborne and Clydach, the supply of precious metals concentrates which form the raw material for the English refinery at Acton was greatly reduced, entailing a corresponding reduction in the output of platinum and palladium. Platinum production was 26,213 ounces compared with 44,725 ounces for 1931 and the production of palladium fell from 39,313 ounces in 1931 to 29,496 ounces in 1932. The purity of the metals has consistently improved. Experimental work looking to the increased use of the platinum metals has been actively prosecuted throughout the year and further progress made in the electro-plating of palladium. Falconbridge Nickel Mines Ltd., continuously operated the department for concentrating precious metal slimes in its Norwegian refinery and shipments of concentrated slimes took place at suitable intervals.

Chas. Engelhard, President, Baker & Co. Inc., states in "Metal and Mineral Markets" that: "Though the platinum metals, taken as a group, suffered during 1932 under the world-wide depression in business, efforts to expand the market met with success in a number of instances. Platinum actually has improved its position in the jewellery trade.... Of equal importance was the realization by the jewellery trade that iridium-platinum could be drawn and spun with relative ease, and that its surface had a distinctive and interesting appearance.... Radically new types of plating baths, for the deposition of platinum and palladium were developed and the already highly successful rhodium baths were further improved. Rhodium was increasingly used where a white, highly reflective, non-tarnishing electroplate was required. Platinum metals in dental alloys received further attention. Recognition of the fact that the high palladium content dental alloys, which are white in colour, are less conspicuous than gold, led to the development and marketing of such alloys by several of the leading manufacturers of dental supplies. During 1932

considerable interest was shown in the development of long-life platinum wound furnaces, in the form of small laboratory and dental equipment as well as commercial furnaces. Platinum as a catalyst in the production of sulphuric acid was given more attention in 1932. Tests of corrosion-resisting alloys containing platinum were begun in chemical plant equipment in which base metals proved to be inadequate.

The International Platinum Cartel appears to have become more active, and it may now be able to make its effectiveness felt in the trade in a higher degree than before. Recent trade movements indicate that the Soviets are co-operating with the Cartel.

Prices for platinum have fluctuated greatly. In 1883 it was quoted as low as \$5.49 per troy ounce; during 1923 it reached \$125 later receding to \$72 in 1927, while in 1932, it sold at an average New York price of \$36.45 per ounce troy.

Table 103.—Production of the Platinum Group Metals in Canada, 1931 and 1932

	Platinum		Palladium, Rhodium Iridium, etc.	
	Ounces	Value	Ounces	Value
		\$		\$
1931				
Ontario.....	44,725	1,595,117	46,918	1,217,717
British Columbia.....	50	1,783		
Total.....	44,775	1,596,900	46,918	1,217,717
1932				
Ontario.....	27,284	1,097,021	37,613	901,890
British Columbia.....	59	2,372		
Total.....	27,343	1,099,393	37,613	901,890

Table 104.—Production of Metals of the Platinum Group, 1923-1932

(From 1887 to 1922 see Mineral Production of Canada, 1928)

Year	Platinum				Palladium	
	Lode		Placer			
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1923.....	6,810	793,617	7	816	8,511	584,280
1924.....	9,181	1,090,858	5	569	8,923	811,993
1925.....	8,692	1,027,477	6	715	7,856	608,727
1926.....	9,471	919,349	50	4,258	9,790	626,166
1927.....	11,217	716,653	11	960	11,247	541,319
1928.....	10,483	706,090	49	2,819	11,909	511,998
1929.....	12,491	845,057	28	1,699	12,408	471,614
1930.....	34,007	1,542,490	17	771	29,959	689,217
1931.....	44,725	1,595,117	50	1,783	39,313	786,260
1932.....	27,284	1,097,021	59	2,372	29,727	548,582

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1923.....	206	18,540					98	26,460
1924.....	367	27,500	78	2,106	69	4,924	79	16,590
1925.....					432	40,242		
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			242	78,553
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						
1931.....	(a) 7,605	431,457						
1932.....	(a) 7,886	353,308						

(a) Includes rhodium, iridium and ruthenium as other platinum metals.

Table 105.—Production of Platinum in Canada from Alluvial Sands, 1923-1932

(For years 1887 to 1922 see 1928 Mineral Production of Canada)

Year	Fine ounces	Value	Year	Fine ounces	Value
		\$			\$
1923.....	7	816	1928.....	49	2,819
1924.....	5	569	1929.....	28	1,699
1925.....	6	715	1930.....	17	771
1926.....	50	4,258	1931.....	50	1,783
1927.....	11	960	1932.....	59	2,372

Table 106.—Imports into Canada and Exports of Platinum, 1930-1932

	1930		1931		1932	
	Fine ounces	Value	Fine ounces	Value	Fine ounces	Value
		\$		\$		\$
IMPORTS—						
Crucibles.....		12,249		7,106		8,638
Wire and bars, strips, sheets or plates, platinum, palladium, iridium, osmium, ruthenium and rhodium in lumps, ingots, powder, sponge or scrap.....		87,467		45,802		29,740
Retorts, pans, condensers, tubing and pipe when imported by manufacturers of sulphuric acid for use exclusively in the manufacture or concentration of sulphuric acid in their own factories....		23,135		1,520		30
Total		122,851		54,428		38,408
EXPORTS—						
Platinum contained in ores and concentrates.....	19,835	1,610,945	14,202	1,135,388	14,570	1,155,705
Old and scrap.....	285	15,653	81	2,070	50	2,374
Total	20,120	1,626,598	14,283	1,137,458	14,620	1,158,079

Table 107.—Platinum Metals Consumed in the United States as Reported by Refiners and by Industries, 1931 and 1932

(From Mineral Industry, 1932)

(In Troy ounces)

Industry	Platinum	Palladium	Iridium	Others	Total	Percentage of total
1931						
Chemical.....	11,483	979	18	64	12,544	11
Electrical.....	8,215	22,628	609	17	31,469	26
Dental.....	10,135	9,394	74	13	19,616	17
Jewellery.....	41,261	2,988	2,185	264	46,698	39
Miscellaneous.....	5,896	1,934	373	667	8,870	7
Total	76,990	37,923	3,259	1,025	119,197	100
1932						
Chemical.....	5,157	52	495	218	5,922	7
Electrical.....	3,456	431	6,309	23	10,219	12
Dental.....	8,683	73	12,900	9	21,665	26
Jewellery.....	33,376	1,719	5,817	314	41,226	50
Miscellaneous.....	3,896	274	204	27	4,401	5
Total	54,568	2,549	25,725	591	83,433	100

Table 108.—World Production of Platinum Metals, 1930-1932

(Supplied by *Imperial Institute*)

(Fine ounces)

Country and Product	1930	1931	1932	Country and Product	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
<i>Sierra Leone</i> —				<i>Papua</i> (years ended June 30)			
Crude.....	542	594	527	Osmiridium from placers	11	20	1
				Platinum from placers....			2
<i>Union of South Africa</i> —				<i>Russia</i> —			
Crude (content).....	49,375	41,220	7,766	Crude platinum from placers			
Concentrates (content)...	5,967	5,943	1,480	(estimated).....	100,000	100,000	100,000
Osmiridium.....	5,732	6,306	6,523	<i>Abyssinia</i> —			
<i>Canada</i> —				Platinum (unrefined)....	3,805 (b)	6,000	8,217
Platinum from placers....	17	50	59	<i>United States</i> — (c)			
Recovered from Ontario				Platinum from placers....	527	885	1,074
nickel-copper matte—				New platinum metals recovered by refineries			
Platinum.....	34,007	44,725	27,284	from domestic produce			
Palladium.....	29,959	39,313	37,613	Platinum.....	5,348	5,595	1,912
Other metals.....	4,133	7,605		Palladium.....	3,656	2,597	1,148
<i>New South Wales</i> —				Iridium.....	128	78	78
Platinum from placers....	155	283	336	Osmiridium.....	57	35	46
<i>Tasmania</i> —				Others.....	119	88	8
Osmiridium from placers.	953	1,280	785	<i>Colombia</i> —			
<i>New Zealand</i> —				Platinum from placers	40,803	35,793	40,477
Platinum from placers....	3	1		<i>Japan</i> —			
				Platinum from placers....	128	275	(a)

(a) Information not available.

(b) Estimated.

(c) Secondary metals were recovered as follows (troy ounces)—

	1930	1931	1932
Platinum.....	33,787	33,837	21,635
Palladium.....	7,426	6,331	5,783
Iridium.....	4,354	1,823	3,726
Others.....	1,749	1,743	1,444

CHAPTER FIVE

MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics, Showing Production by Provinces, Imports, Exports, Prices and World Output Tables on Aluminium, Antimony, Beryl, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Radium, Selenium, Tin, Titanium, Tungsten and Vanadium

1. General Review

Metal-bearing minerals, mined or treated usually by a very few operators, have been grouped in this chapter for consideration as a single industry. The iron and steel industry is one of the larger and better organized in Canada; ores utilized in Canadian iron furnaces are imported either from the Mesabi range in Minnesota, U.S.A., or from the Wabana deposits on Bell Island, Newfoundland. Iron ores consisting of hematite, siderite and magnetite occur in rather extensive deposits in Canada. These ores are usually of lower grade than those imported and their utilization in the Canadian steel industry would necessitate the employment of beneficiation methods. The Canadian aluminium industry is also very important; the production of this metal in the Dominion comes entirely from the province of Quebec. Bauxite, the crude aluminium ore employed in the manufacture of Canadian made aluminium is mined in foreign countries.

This chapter also includes a review of the occurrences of antimony, beryllium, cadmium, chromium, lithium, magnesium, manganese, mercury, molybdenum, radium, selenium, tin, tungsten and vanadium ores in Canada. The mining of these in Canada at the present time is relatively unimportant, and their future economic value will be largely determined by the existing demand and the extent of available supplies from other producing countries.

Some of these smaller industries have, in the past, attained considerable importance and it is probable that future technical research and industrial requirements may once again stimulate expansion in these and other undeveloped mineral fields.

For historical purposes and to provide the interested reader with available data, tables have been prepared for this report that set out the known facts regarding production in these industries.

Mining or metallurgical operations relating to the development or extraction of ores or production of metals that are classified in this chapter as miscellaneous were, with the exception of aluminium, relatively small in 1932 as compared with those of the gold and other major metal mining industries. In Nova Scotia the Indian Path Mines, Ltd., conducted some underground exploration at a tungsten mine located at Indian Path, and near Welsford, Queens county, New Brunswick. Molybdenite and wolframite were discovered and the occurrences actively explored. At Arvida and Shawinigan Falls in Quebec, metallic aluminium was produced from imported alumina, and at Thetford Mines a small production of chromite was reported. Radium-bearing deposits were under development near Cheddar and Wilberforce, Ontario, and at Deloro a silver-lead-bismuth bullion was produced in the plants of the Deloro Smelting and Refining Co. Ltd. In Manitoba the Hudson Bay Mining and Smelting Company recovered cadmium at Flin Flon in the form of a cadmium sponge. British Columbia chromite deposits north of Clinton were under development and carnotite veins on the Quadra Island in the Nanaimo mining division were explored. Cadmium and bismuth in the metallic form were made at Trail by the Consolidated Mining and Smelting Company of Canada. At Great Bear Lake in the Northwest Territories, uranium-radium-silver deposits were actively worked and shipments of high grade silver-pitchblende ores made to metallurgical plants.

Table 109.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1931 and 1932

	1931			1932		
	Number of employees		Salaries and wages	Number of employees		Salaries and wages
	Male	Female	\$	Male	Female	\$
Salaried Employees—						
Total.....	3		5,954	5		8,335
Wage-Earners—						
Surface.....	23		19,740	20		26,846
Underground.....	6			8		
Mill.....				1		
Total.....	29		19,740	29		26,846
Grand Total.....	32		25,694	34		35,181

2. Commodity Statistics on Aluminium, Antimony, Beryllium, Bismuth, Cadmium, Calcium, Chromite, Iron Ore, Pig Iron, Ferro-Alloys, Steel and Rolled Products, Manganese, Mercury, Molybdenum, Radium, Selenium, Tin, Titanium and Tungsten

ALUMINIUM

Aluminium is a product of the electric furnace; alumina, which has been recovered by chemical means from bauxite, is dissolved in molten cryolite in the electric furnace; a low voltage current decomposes the oxide into metallic aluminium and oxygen, the metal sinking to the bottom of the crucible. All cryolite ore is obtained from Greenland. Aluminium, in addition to its use in the pure state, is alloyed with other metals including copper, nickel, cobalt, iron, antimony, tin, zinc, beryllium and magnesium. Pure aluminium powder is used in the thermit process to reduce the oxides of certain metals to the metallic state.

Aluminium ores have not been found in commercial quantities in Canada. Metallic aluminium is produced from foreign ores by the Aluminium Company of Canada, Ltd., at Shawinigan Falls and Arvida, P.Q. As there is only one Canadian company producing primary aluminium statistics regarding the smelting operations have been included with data supplied by the smelters producing non-ferrous metals from Canadian ores. During 1932 the slag ore plant at Arvida was idle; the reduction works were, however, in continuous operation throughout the year, both the reduction and fabricating works of the company at Shawinigan Falls were active. The reduction plants at both Shawinigan Falls and Arvida treated imported alumina in the manufacture of aluminium pig. The United States Bureau of Mines reports that continued inactivity in many branches of industry using aluminium and limited production in others, resulted in a further decline in the output of aluminium in 1932. This was partly offset, however, by the development of many new products and the creation of additional markets. In 1932 a light streamlined railcar built almost entirely of strong aluminium alloys was completed and work continued on the aluminization of a pullman and a de luxe passenger coach. During the year pressed aluminium alloy frames for trucks and trailers were placed on the market. It is noteworthy that in 1930 approximately 4 per cent of the total consumption of aluminium in the United States was employed in the building industry while in 1932 it had risen to 10 per cent. Aluminium foil has now been adopted for the insulation of some electric refrigerators.

A new finish for aluminium, obtained by dyeing the surface instead of coating it has been perfected. By means of the new process small metal products are being dyed after fabrication and in certain instances sheets are dyed before being stamped. Aluminium cooking utensils for home use have been manufactured in the vivid colours formerly obtainable only in high-quality vitreous enamelled ware.

The Aluminium Age will be the next metal age for our civilization, according to Prof. Colin G. Fink, head of the Division of Electrochemistry, Columbia University, New York. There is every indication, he states, that by 1942 the world's output of aluminium will total 600,000 tons . . . Whereas the supply of raw material for many of our metals is comparatively limited in years, the supply of bauxite or aluminium ore is almost limitless.

Table 110.—Imports of Aluminium and its Products into Canada and Exports of Aluminium, 1930-1932

	1930		1931		1932	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Alumina and Bauxite ore.....	213,744,700	3,083,092	191,619,700	3,127,174	103,362,600	2,044,909
Cryolite ore.....	4,755,900	201,355	4,707,400	188,414	174,700	14,637
Aluminium—						
Ingots, blocks, pigs, slabs, etc.....	159,611	39,609	333,315	65,568	207,067	32,319
Bars, rods and wire.....	2,580,729	576,240	404,619	92,509	80,564	31,357
Sheets, strips or plates.....	1,213,604	344,009	1,441,465	353,420	1,257,754	287,827
Leaf or foil.....		233,375		128,670		113,341
Tubing and pipe.....	150,302	72,679	43,262	22,204	58,898	30,268
Household hollow-ware.....		372,132		203,962		94,843
Manufactures, n.o.p.....		1,373,781		1,011,644		754,488
Total.....		6,296,272		5,193,565		3,403,989
EXPORTS—						
Aluminium—						
Bars, blocks, etc.....	43,204,200	7,728,857	21,539,200	3,593,230	18,345,000	2,797,257
Kitchen utensils and hollow-ware.....		19,453		5,167		8,691
Scrap.....	2,750,600	381,408	3,730,200	393,766	1,311,600	135,543
Manufactures, n.o.p.....		1,800,712		503,014		961,895
Total.....		9,930,430		4,495,177		3,903,386

Table 111.—Estimated World Production of Aluminium, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932
BRITISH EMPIRE			
United Kingdom.....	13,000	14,000	10,000
Canada.....	32,000	28,000	17,500
Total.....	45,000	42,000	27,500
FOREIGN COUNTRIES			
Austria.....	3,000	3,000	2,000
France.....	24,251	19,000	14,300
Germany.....	30,200	27,000	18,700
Italy (c).....	7,842	10,931	13,201
Norway (c).....	26,925	21,082	17,506
Russia.....	200	(a)	1,000
Spain.....	1,100	1,134	1,000
Switzerland.....	20,800	13,000	8,000
United States (c) (d).....	102,248	79,261	46,824
Total.....	217,000	175,000	123,000
World's Total.....	262,000	217,000	150,000

(a) Information not available.

(b) Year ended April 30, 1931.

(c) Official figures.

(d) Secondary metal was recovered as follows:—1930, 34,464 long tons; 1931, 27,054 long tons; 1932, 21,400 long tons.

Table 112.—World Production of Bauxite, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE—				FOREIGN COUNTRIES—Con.			
Northern Ireland.....	2,037	3,340	1,473	Greece.....	2,244	1,132	1,000
British Guiana—				Hungary.....	31,195	84,379	109,796
60% or over alumina...	120,083	124,963	65,107	Italy.....	158,641	66,305	85,186
30 to 50% alumina†....	26,913	32,115	18,396	Yugoslavia.....	93,204	61,039	66,027
India.....	2,514			Roumania.....	667	375	602
Australia—				Russia (years ended			
New South Wales.....		196		Sept. 30).....	12,000	*	*
Victoria.....	789	1,384	*	Spain.....	318		1,300
Total.....	152,000	162,000	86,000	United States.....	330,612	195,895	96,349
FOREIGN COUNTRIES—				Dutch Guiana.....	260,377	170,419	124,518
France.....	599,600	342,452	387,446	Total.....	1,490,000	†920,000	†870,000
Germany.....	1,369		1,612	World's Total.....	1,640,000	†1,080,000	†960,000

*Information not available.

†Ore remains at the mines.

‡Excluding the production in Austria and U.S.S.R. (Russia) which is not available.

Table 113.—Production (Exports) of Cryolite from Greenland, 1928-1932

	Long tons
1928.....	25,524
1929.....	29,310
1930.....	35,671
1931.....	17,427
1932.....	17,592

ANTIMONY

Antimony bearing minerals are known to occur in British Columbia, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, and the Yukon. The greater part of the Canadian output of refined antimony was produced in the years 1907, 1909, 1915 and 1916 by the Consolidated Mining and Smelting Company at Trail, B.C.; the metal was recovered as a by-product in the treatment of silver-lead ores. The remainder of the Canadian antimony production came from deposits mined in Nova Scotia and New Brunswick.

A vein containing auriferous stibnite and native antimony associated with arsenopyrite, pyrite, and galena was mined at West Gore, Hants County, Nova Scotia, during the war period; the ore was milled at the property to yield a 38 to 45 per cent antimony concentrate. There has been no Canadian production of antimony since 1926.

Stibnite with small quantities of native antimony was discovered about 1850 in the slates and quartzites at Prince William, York county, New Brunswick. Local attempts to reduce the ore were failures, crude ore was then shipped until the property closed in 1890. During the late war period this ore was smelted and refined near Lake George. During 1931, 25 tons of antimony ore were shipped to Liverpool, England, from the Lake George mines, York county, New Brunswick. This shipment was made for experimental purposes.

Antimony ores are rare in the province of Ontario. Minerals containing this metal have been found in Hastings, Addington and Frontenac counties and in the silver ores of the Cobalt district. Antimony deposits have been partially developed in South Wolfe county, Quebec.

There are several occurrences of antimony in British Columbia. In the Bridge river area, Lillooet mining division, stibnite occurs in quartz; the ore here contains on the average, 40 to 60 per cent antimony and is free from arsenic, zinc and lead. A few shipments have been made from a deposit on the north fork of Carpenter creek in the Slocan district. Antimony has also been found on Graham Island, at Tatlayoko lake, Nanaimo district, and in the vicinity of Kamloops lake where it is associated with cinnabar.

In the Yukon Territory antimony ores occur in the Carbon and Chieftain hills near the Wheaton river.

No sales of antimony ores were recorded in Canada in 1932. There was, however, a small shipment of high grade antimony ore made to Germany from the Lake George mines, York county, New Brunswick; this was for experimental purposes.

An Antimony Association has been established by the Bureau of Reconstruction of the government of Hunan, a Chinese province which accounts for more than 75 per cent of the world's supply. The Association will pay to the government a fee of 10 per cent of the fixed price of all exports from the province. The enterprise began to function January 1st, 1933, with a minimum purchase price at Changsha of silver \$280 per long ton, making the Association's selling price \$308.

Antimony prices at the close of 1932 were as follows: antimony ore per unit, 80 to 90 cents, f.o.b. New York. London, per long ton unit, 3s. 3d. for 60 to 65 per cent sulphide ore. Metallic antimony, f.o.b. New York, Chinese (duty paid) and American, spot, per lb. 5.40 cents.

Table 114.—Production of Antimony in Canada, 1911-1932

Year	Antimony ore		Refined regulus		Antimony in silver-lead-bismuth bullion exported	
	Tons	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1911-1914.....						
1915.....	1,341	81,283	59,440	11,888		
1916.....	885	94,537	107,185	41,823		
1917.....	361	22,000				
1918-1924.....						
1925.....					1,751	206
1926.....					1,596	281
1927-1932.....						

NOTE.—For years 1886 to 1910 see previous reports.

Table 115.—Imports of Antimony into Canada, 1930-1932

	1930		1931		1932	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Antimony, or regulus of.....	1,303,560	87,027	919,724	56,458	631,204	37,180
Antimony salts, viz.: Tartar emetic, chloride and lactate (antimonine).....	14,168	2,862	3,178	482	50,466	6,869
Antimony salts for dyeing.....	6,978	829	46,017	2,763	678	86
Total.....		90,718		59,703		44,135

World Production of Antimony.—China is by far the greatest antimony-producing country in the world, and as consumption of antimony in that country is only 1 per cent of its production, large quantities are available for export. There are many valuable deposits in the various provinces of China, but in the province of Hunan alone there is said to be 2,000,000 tons, much of which has not been developed.

Table 116.—World Production of Antimony Ore, 1930-1932

(In terms of metal)
(Supplied by *Imperial Institute*)
(Long tons)

Producing country	1930	1931	1932	Producing country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—CON.			
Southern Rhodesia.....	34			Italy.....	406	331	405
India (ore).....	3			Yugoslavia.....	2	40	(a)
Canada (ore).....		22		Algeria.....		100	261
Australia (estimated).....	55	42	60	Morocco (Spanish).....		100	(a)
FOREIGN COUNTRIES				Mexico.....	2,984	5,357	1,317
United States.....			374	Bolivia (exports).....	1,141	1,327	1,446
Czechoslovakia.....	378	556	567	Peru.....	60	(b) 29	(b) 18
France.....	1,220	812	300	China (c).....	16,917	18,320	13,675
Greece.....	66	268	(a)	Turkey.....	34	21	
				Japan.....		2	66

(a) Information not available.

(b) Exports.

(c) Figures refer to regulus, crude and oxide and not to metal content.

BERYLLIUM

Shipments of beryl crystals were made to Germany in 1927 from a deposit in Lyndoch township, Renfrew county, Ontario. Beryl occurrences in the pegmatites of eastern Manitoba have been investigated during recent years. Beryllium is a steel-grey metal, it easily tarnishes in air and shows a complete lack of ductility at ordinary temperatures. The density is 1.84 or less than that of aluminium. A remarkable property of beryllium, and one which has already been put to extensive practical use, is the fact that it is remarkably transparent to X-rays.

Considerable research work has been conducted as to the commercial utilization of the metal beryllium, especially in alloys. The principal ore of beryllium consists of the mineral beryl ($\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$). There are several known occurrences of this mineral in Canada and shipments of beryllium ores have been made for experimental purposes from deposits in Renfrew county, Ontario, and from the Oiseau river area in Manitoba. No shipments were recorded either in 1931 or 1932.

Beryllium-copper alloys have received much attention during the last two years. They are noted, states "Metal and Mineral Markets" for their excellent physical properties which may be still further improved by suitable heat-treatment. The range of composition of commercial useful alloys of this type is from 1 to 2.25 per cent beryllium, the usual content being 2.25 per cent with the remainder pure copper. Advantages claimed for these alloys are high tensile strength and great hardness. At present beryllium-copper is delivered in sheets, strips, rods, wire and tubes, in sizes and gauges in which phosphor bronze is usually furnished. New York price for beryllium-copper, at the close of 1932, was \$6.25 per pound containing 12.5 per cent of beryllium.

BISMUTH

Bismuth occurs in small quantities with ores of the Cobalt district in Ontario and in ores treated at the Trail smelter in British Columbia.

The output of new bismuth in Canada in 1932 totalled 16,855 pounds valued at \$7,340 as compared with 118,207 pounds worth \$157,650 in 1931. The production for 1932 consisted of the metal contained in silver-lead-bismuth bullion exported by the Deloro Smelting and Refining Co. Ltd., Deloro, Ontario, and metallic bismuth produced in British Columbia by the Consolidated Mining and Smelting Co. Ltd. The principal bismuth producing countries are the United States, Bolivia, Spain, Canada, Japan, Australia and Peru. In Spain and Bolivia the ores are mined while in other countries the metal is recovered as a by-product in the smelting and refining of other ores.

The chief uses of bismuth are in the manufacture of pharmaceutical chemicals and in low melting alloys. It has been recently suggested that great possibilities exist for the adoption of this metal in solder and sheathing for telephone and telegraph cables.

Total imports of metallic bismuth into Canada during 1932 amounted to 5 pounds valued at \$9 as compared with 125 pounds at \$50 in 1931. Bismuth salts valued at \$21,229 were imported in 1932 as against a value of \$27,024 during the previous year. Prices for bismuth metal in December, 1932, were—New York, f.o.b., 85 cents per pound in ton lots; London (dollar basis), 75 cents.

(Cwt.—112 pounds)

Producing country and description	1930	1931	1932
BRITISH EMPIRE			
Canada—metal and content of bullion	114	1,055	151
India—(ore)	1	<i>ib.</i> 42	<i>ib.</i> 27
Australia—(ore, etc.)	83	792	385
FOREIGN COUNTRIES			
Germany (Saxony)—(Bismuth-cobalt-nickel-ore)	2,342	1,299	2,154
Spain—(ore)	1,310	2,244	650
(metal)	632	531	669
Mexico—ore (bi-content)	.....	.....	343
Bolivia (exports)—(Content of ore and concentrates)	1,219	523	46
Peru—ore (bi-content)	2,441	(b) 5,532	(b) 861
China—(ore)	3,140	2,620	(a)
Japan—(metal)	1,079	1,115	938

(b) Exports.

CADMIUM

Cadmium was produced in Canada for the first time in 1928 at the Trail refinery of the Consolidated Mining and Smelting Company Limited as a by-product in the refining of zinc.

Cadmium produced in Canada during 1932 consisted of the metal recovered as a by-product in the production of refined zinc at the Trail refinery in British Columbia by the Consolidated Mining and Smelting Co. Ltd. The Canadian output for the year was valued at \$26,824 as compared with \$180,958 in 1931 and \$337,871 in 1930. Consolidated Mining and Smelting Company reports that sales of cadmium in 1932 were about the same as in 1931, but owing to keen competition prices were somewhat lower. The Hudson Bay Mining and Smelting Co. Ltd., treated 1,417 tons of cadmium precipitate at Flin Flon, Manitoba. This averaged 46 per cent zinc, 3.30 per cent cadmium and 6.97 per cent copper from which were produced a copper precipitate containing 183,000 pounds of copper, a high grade cadmium sponge containing 57,397 pounds of metallic cadmium and a solution containing 1,143,310 pounds of zinc.

Cadmium, once a rare laboratory product, is now an important by-product of zinc manufacture. Its increased production has resulted in the opening up of a large field in the preservation of iron and steel.

Cadmium has obtained a strong position as a plating metal, especially in the automobile industry; the metal is also used in silver, gold, copper and fusible alloys and in the manufacture of pigments. Cadmium compounds such as the chloride, iodide, bromide, and nitrate, find various uses in the chemical industries. Cadmium prices, December, 1932, were as follows: New York, 55 cents per pound; London, 1s. 8d. nominal.

(Lb. avdp.)

Country	1930	1931	1932
BRITISH EMPIRE			
Canada.....	456,582	323,139	65,425
Australia.....	509,598	445,158	354,620
FOREIGN COUNTRIES			
Belgium (exports).....	11,200	6,400	51,400
France.....	158,700	181,167	274,451
Italy.....		17,600	13,200
United States—			
Metal.....	2,777,762	1,020,535	799,501
Compounds (metal content).....	316,300	337,200	259,800
Mexico (a).....	1,207,564	70,175	189,981

(a) Recorded as cadmium, but probably zinc-cadmium exported to the United States for treatment.

CALCIUM

Calcium as a metal, and in alloys with copper, lead, silicon and aluminium, is finding ever increasing outlets in the ferrous and non-ferrous metal industries. It is used as an addition agent for the removal of such impurities as oxygen, carbon, chlorine, sulphur and phosphorus in the casting of metals, and the use of calcium in the refining of lead made it possible to remove bismuth from lead without electrolytic refining. Small percentages of calcium, along with barium, have been used for several years as a hardening agent in lead for bearings, and a lead-calcium alloy has recently been developed for use as cable sheathing (Mineral Industry).

The current price of the metal of 98.5-99 per cent purity was about \$1.50 per pound, in 10-lb. cans or 100-lb. cases.

CHROMIUM

The mineral chromite (FeO , Cr_2O_3) is the commercial source of the metal chromium which is of prime importance in the manufacture of chrome steel armour plate and other similar steels. Chromium is a necessary constituent of many high-speed cutting tools, and its use is well established in the manufacture of stainless steels, in which it makes up from 12 to 14 per cent or higher of the alloy. Production of chromite in Canada for 1932 amounted to 78 tons valued at \$1,113 and constitutes the first output of this mineral in the Dominion since 1929. The entire 1932 output came from the Thetford Mines area in the province of Quebec. Chromite deposits located a few miles north of Clinton, British Columbia, were under development in 1932.

The U.S.S.R. report that the Khalilov complex ore deposits discovered during the first Five-Year Plan period in the middle Volga region, are being prepared for mining. These deposits contain nickel and chrome; mining work will begin here in 1933.

The "Mining Journal", London, remarks that the Southern Rhodesia chromite deposits at Selukwe are apparently not approached in magnitude by any other known single source of ore. The other important occurrences of chromite include the New Caledonian deposits (largely depleted), the Indian occurrences in Mysore and Baluchistan, the Transvaal, and Russia. The British Empire not only contains the largest producing chromite mine at Selukwe but probably the largest potential supply in the chromite occurrences of the Transvaal and in the Great Dike in Southern Rhodesia, both of which so far have only been very partially developed. The three principal uses for chromite are (1) for the production of ferro-chromium; (2) for the production of bichromates and other chemical compounds of chromium, and recently the chemicals used in electro-plating with chromium, and (3) as a refractory. The market has demanded chromite containing around 50 per cent Cr_2O_3 ; ore of appreciably lower grade than 48 per cent has either not been saleable or if so at unremunerative prices.

Chromium prices, December, 1932, were: New York, 97 per cent grade, spot, 88 cents, contract 83 cents per pound, contained chromium, maximum 1 or 2 per cent iron (usually sold as ferro-chrome); chrome ore per long ton, c.i.f. Atlantic ports, Indian ores, \$14 to \$15 for 46 to 48 per cent Cr_2O_3 ore and \$17 to \$18.50 for 50 to 51 per cent ore. London, 80s. to 85s. for 48 per cent Rhodesian.

Table 119.—Production of Chromite in Canada, 1923-1932

Year	Short tons	Value
		\$
1923.....	3,558	52,650
1924-1928.....	126	900
1929.....		
1930.....		
1931.....		
1932.....	78	1,113

NOTE.—For years 1886 to 1922 see previous reports.

Table 120.—Production in Canada of Chromite, and Imports of Chromium Products, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....					78	1,113
IMPORTS—						
Bichromate of soda.....	985	142,041	805	114,793	1,096	128,717
Bichromate of potash.....	40	7,383	65	11,656	65	12,586
Brick, fire, chrome.....		73,761		48,230		9,848
Chromium steel.....	2,234	123,335				
Nickel-chromium in bars or rods containing more than 60 per cent nickel and 10 per cent chromium for the manufacture of electrical resistance wire.....	22	44,434	22	45,033	21	46,443

†January 1 to March 31, 1930.

Table 121.—World Production of Chrome Ore, 1930-1932

(Supplied by Imperial Institute)
(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—CON.			
Southern Rhodesia.....	202,385	80,334	15,445	U.S.S.R. (Russia) (years ended Sept. 30).....	65,028	(a)	(a)
Union of South Africa.....	13,508	22,966	19,065	Cuba.....	38,996	11,882	500
Cyprus.....	1,544	200	(c) 1,000	United States.....	310	762	200
Canada.....			70	Brazil (exports).....	10		
India.....	50,684	19,913	17,865	French Indo-China.....	1,500	1,400	(a)
Australia.....	168	26	97	Japan.....	11,169	9,573	12,295
Total.....	268,000	123,000	54,000	Turkey.....	27,750	24,981	54,344
FOREIGN COUNTRIES				New Caledonia.....	61,000	72,979	68,332
Greece.....	23,032	5,545	12,000	Total.....	280,000	(b) 180,000	(b) 190,000
Yugoslavia.....	50,583	56,238	43,231	World's Total.....	550,000	(b) 300,000	(b) 240,000
Norway.....			403				

(a) Information not available.

(b) Excluding U.S.S.R. (Russia.)

(c) Estimated.

IRON ORE

Iron ore was first discovered in Canada in the St. Maurice valley, Quebec, as early as 1667, or perhaps earlier. Count Frontenac mined ore there five years later and the samples, tested in France, were found to be of workable quality.

In 1730 M. Franchville was granted a licence by Louis XIV of France together with a subsidy of 10,000 "livres" to work the St. Maurice iron mines. The project contemplated the construction of a blast furnace which apparently was not successful, for, in 1735, he surrendered his rights to the government. Some years later another licence and a subsidy were given La Compagnie des Forges which made not only the iron kettles that were needed by the pioneers for making sugar and soap but furnished the French government with cannon for military enterprises. In 1743 the plant again reverted to the crown and was operated by the government until the country passed into the hands of the British.

Nova Scotia with its large iron and steel industry is not at present a producer of iron ore. The large deposits of high-grade iron ore in Newfoundland owned and operated by the British Empire Steel Corporation, are much more readily accessible and of a higher and more constant grade than the iron ore deposits in Nova Scotia and for that reason the local deposits are not mined.

Iron ore mining and smelting were carried on to a small extent in New Brunswick but the ore was low-grade and the operations did not prosper.

Iron ore was first mined and smelted in the province of Quebec early in the eighteenth century, and from that time until 1883 the industry was carried on almost continuously at Three Rivers in the St. Maurice district. Other furnaces using local ore were operated at Radnor Forges and at Drummondville, the last to shut down being the Drummondville furnace in 1911. The ores used were bog ores, with charcoal for fuel. The output of all the furnaces was small and the industry owed its success to the superior quality of the pig iron produced.

Furnaces have also been built at various times and places in attempts to smelt some of the other classes of ore found in the province, these were all short lived, and none achieved commercial success.

In northwestern Ontario about 1899, a deposit of hematite, that later developed into the Helen mine, was found, this mine proved the main source of Ontario's iron output for a number of years. The high grade ore was exhausted and the mine is now closed down. Ontario has a large supply of low-grade iron ore, but beneficiation processes must be applied to make these ores suitable for commercial use.

Production of iron ore in British Columbia has been almost negligible up to the present time, however, the small production has not been caused so much by the lack of ore as by the scarcity of a market for the ore.

Table 122.—Shipments of Iron and Titanium Ores from Canadian Mines, by Provinces, 1923-1932

(For years 1886 to 1922 see Mineral Production of Canada, 1928)

(Short tons)

Year	Quebec	Ontario	British Columbia	Canada
1923.....	69	30,447	243	30,759
1924.....	1,408	44	28	1,480
1925*.....	3,978			3,978
1926.....	200			200
1927.....	2,029			2,029
1928.....	2,244			2,244
1929.....	2,748			2,748
1930.....	412			412
1931.....	1,509			1,509
1932.....				

*1925-1931—shipments consist of titaniferous ore.

Table 123.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1923-1932

(For years 1895 to 1922 see Mineral Production of Canada, 1928)

Year	To Nova Scotia	To United States	To Europe	Total shipments
	Short tons	Short tons	Short tons	Short tons
1923.....	451,483		356,753	808,236
1924.....	174,602		919,968	1,094,570
1925.....	384,795		883,056	1,267,851
1926.....	465,961		503,640	969,601
1927.....	480,757	68,354	949,569	1,498,680
1928.....	690,316	41,493	1,001,833	1,733,642
1929.....	763,168	85,501	850,370	1,699,039
1930*.....	523,918	54,623	740,774	1,319,315
1931.....	234,148	25,670	530,079	789,897
1932*.....			166,303	166,303

*European shipments in 1930 and 1932 were to Germany only.

Table 124.—Imports into Canada, and Exports of Iron Ore, 1931 and 1932

	1931		1932	
	Quantity	Value	Quantity	Value
	Short tons	\$	Short tons	\$
IMPORTS—				
Iron ore from United States.....	551,166	1,233,254	59,449	146,763
Iron ore from Newfoundland.....	230,851	440,301		
Iron ore from other countries.....	26,403	44,888	8,118	37,600
Total.....	808,420	1,718,443	67,567	184,363
EXPORTS— Total.....	1,555	5,192	720	2,354

Table 125.—World Production of Iron Ore (including Manganiferous Iron Ore)

(Supplied by *Imperial Institute*)

(Long tons)

Country	Ore			Estimated iron content		
	1930	1931	1932	1930	1931	1932
BRITISH EMPIRE						
Great Britain (f).....	11,627,233	7,625,860	7,328,190	3,604,400	2,364,000	2,198,500
Northern Rhodesia.....	9	759	711	3	266	464
Southern Rhodesia.....	2,484	526	.....	600	150	.....
S.W. Africa.....	39,338	21,863	.....	(a)	(a)	.....
Union of South Africa.....	50,846	15,203	31,196	25,866	5,911	11,140
Newfoundland.....	1,450,123	537,210	317,858	754,000	279,000	165,000
India.....	1,849,625	1,624,883	1,760,501	1,180,000	1,040,000	1,130,000
Unfederated Malay States.....	777,785	691,986	688,179	497,000	441,000	440,000
Australia.....	934,609	297,400	546,160	618,000	196,000	360,000
New Zealand.....	16,150	6,920	.....	8,800	3,700	.....
Total.....	16,800,000	10,800,000	10,700,000	.....	.....	.....
FOREIGN COUNTRIES						
Austria.....	1,161,808	503,859	301,951	388,780	178,475	105,419
Belgium.....	128,921	123,833	(a)	58,000	56,000	(a)
Czechoslovakia.....	1,626,814	1,215,572	(a)	522,705	388,153	(a)
France.....	47,803,869	38,171,666	27,322,882	17,000,000	13,000,000	9,000,000
Germany (b).....	5,648,219	2,579,900	1,318,600	1,816,193	828,243	435,736
Greece.....	252,115	232,289	(a)	119,467	102,100	(a)
Hungary.....	154,854	82,706	52,029	(a)	(a)	(a)
Italy.....	717,849	565,676	420,321	352,974	278,600	191,300
Yugoslavia.....	424,378	131,009	26,215	233,000	72,000	14,000
Luxemburg.....	6,544,354	4,689,671	3,161,879	1,967,233	1,434,296	983,050
Norway.....	760,224	565,807	368,002	498,467	372,232	241,044
Poland.....	469,610	280,000	75,635	131,000	73,000	20,000
Egypt.....	.....	.....	25	.....	.....	(a)
Roumania.....	91,056	60,929	88,592	40,000	27,000	3,600
Russia.....	10,260,000	10,444,600	(a)	(a)	(a)	(a)
Spain.....	5,437,519	3,139,818	1,732,667	2,570,000	1,480,000	790,000
Sweden.....	11,058,964	6,959,193	3,246,886	6,740,000	4,275,000	2,000,000
Switzerland (exports).....	100,316	33,698	11,675	(a)	(a)	(a)
Algeria.....	2,196,619	1,000,896	459,560	1,098,300	500,500	229,800
Belgian Congo.....	55,000	19,000	.....	(a)	(a)	.....
Morocco (Spanish) (e).....	740,827	492,743	168,478	407,000	271,000	93,000
Tunis.....	815,000	435,000	206,000	430,000	225,000	106,000
Cuba.....	244,773	223,218	185,248	107,500	52,300	(a)
Mexico.....	105,289	(a)	26,694	(a)	(a)	(a)
United States (d).....	59,194,054	31,412,916	9,872,350	29,600,000	15,700,000	4,900,000
Brazil (estimated).....	30,000	30,000	30,000	20,000	20,000	20,000
Chile.....	1,693,349	701,000	168,420	1,117,611	463,000	111,000
China.....	2,225,500	2,206,800	(g) 554,960	(a)	(a)	(a)
Japan.....	242,106	(a)	(a)	(a)	(a)	(a)
Korea.....	572,769	157,000	(a)	321,000	86,000	(a)
Turkey.....	.....	492	(a)	.....	(a)	(a)
Total.....	161,000,000	107,000,000	63,000,000	.....	.....	.....
World's Total.....	178,000,000	118,000,000	74,000,000	.....	.....	.....

(a) Information not available.

(b) Including manganiferous ore as follows:

1930.....	Under 12% Mn. 3,016,423 long tons	12-30% Mn. 79,014 long tons
1931.....	2,533,395 long tons	46,505 long tons

(d) Including shipments of manganiferous iron ore as follows:—

1930.....	5-10 % Mn. 707,973 long tons	10-35% Mn. 77,417 long tons
1931.....	217,352 long tons	64,062 long tons
1932.....	9,799 long tons	15,635 long tons

(e) Exports.

(f) In addition bog ore and iron ore (not used for smelting) were produced as follows:—

1930.....	9,524 long tons
1931.....	10,281 long tons
1932.....	9,533 long tons

(g) Excluding Manchuria.

PIG IRON AND FERRO-ALLOYS, STEEL AND ROLLED PRODUCTS

Statistics of pig iron, steel and rolled products, are regarded as belonging to "Manufacturing" rather than to "Mining" but the close relation between the mining of iron ore and the production of pig iron and steel justifies the inclusion here of references to these secondary industries. The data given in this section have been taken from the Bureau's annual bulletin on *The Primary Iron and Steel Industry in Canada, 1932*.

Statistics for the primary iron and steel industry cover the operations of plants engaged chiefly in the manufacture of (a) pig iron, (b) ferro-alloys, (c) steel ingots and direct steel castings, (d) rolled and drawn iron and steel products such as bars, plates, sheets, strips, rails, wire rods, structural shapes, etc. Thirty-six firms were included in this industry in 1932 and reports were received for 52 different plants or departments including 4 blast furnace departments, 1 ferro-alloy plant, 28 steel furnace divisions and 19 rolling or drawing mills.

Factory sales of pig iron, steel and rolled products were valued at \$16,197,526 in 1932 as compared with \$36,911,245 in 1931 and \$52,588,935 in 1930. The 22 works in Ontario accounted for 63 per cent of the total sales for Canada; 6 plants in Nova Scotia provided 16 per cent of the total and 14 works in Quebec accounted for 16 per cent. There were also 4 plants in Manitoba, 3 in Alberta, and 3 in British Columbia.

Capital employed in 1932 was reported at \$96,323,629, a decline of \$8 millions from 1931. Over 77 per cent of this total, or \$74,392,504, represented the value of lands, buildings and equipment.

The average number of employees was 4,847 as compared with 8,026 in 1931 and 9,723 in 1930. About 217 workers were employed in blast furnace departments, 147 in ferro-alloy plants, 1,478 on steel furnaces and 3,005 in rolling mills. Salaries and wages for the year totalled \$6,131,057 as compared with \$11,072,054 in 1931.

(a) Pig Iron.—Production of pig iron in Canada during 1932 totalled 144,130 long tons as compared with 420,038 tons in 1931, and 747,178 tons in 1930.

Imports of pig iron during 1932 amounted to 4,753 long tons, a decline of 39 per cent from the total of 7,912 tons brought in during 1931. Exports were recorded at 2,029 long tons as compared with 2,787 tons in the previous year.

Furnace charges in 1932 included 253,337 long tons of imported ore, 16,297 long tons of mill cinder, etc., 4,145 long tons of scrap, 77,086 short tons of limestone, and 155,932 short tons of coke.

The stocks of pig iron held by the producers at the end of 1932 totalled 125,000 long tons.

Normally, there are 4 producers of pig iron in Canada but one of these concerns did not operate its blast furnace during 1932. These 4 companies have 11 blast furnaces available for use which, if operated at capacity, could produce 1.5 million tons of pig iron per year. Actual production in 1932 totalled 144,130 tons or less than 10 per cent of the rated capacity.

(b) Ferro-Alloys.—Ferromanganese, ferrosilicon, ferro-phosphorus, and spiegeleisen are manufactured in Canada. The output of these ferro-alloys in 1932 amounted to 16,161 tons which was only about one-third of the tonnage made in 1931.

In 1932 ferrosilicon was recovered as a by-product by 3 manufacturers of fused alumina; 1 producer of electric steel castings also made some ferrosilicon; 1 large manufacturer of ferro-alloys produced ferrosilicon, ferromanganese and spiegeleisen; and 1 chemical manufacturer made some ferro-phosphorus.

(c) Steel Ingots and Castings.—Production of steel ingots and direct steel castings totalled 339,346 tons in 1932, a decline of about 50 per cent from the 1931 output of 672,109 tons. The 1932 output included 328,370 tons of ingots and 10,976 tons of direct castings. Practically all of the ingots were transferred to the producers' own rolling mills but only 935 tons of castings were for the producers' own use. Sales of direct castings amounted to 11,023 tons and sales of ingots were reported at 520 tons.

Of the 28 steel plants, 10 were in Quebec, 8 in Ontario, 3 in Manitoba, 3 in British Columbia, 2 in Alberta, and 2 in Nova Scotia. Five of these works operated basic open hearth furnaces only, 18 had electric furnaces only, 2 used both basic open hearth and electric furnaces, and 3

used converters. Seven concerns made basic open hearth steel ingots, 4 made electric ingots, 18 made electric steel castings, 4 made basic open hearth castings and 3 made converter castings. These plants reported steel furnace capacity as follows: 42 basic open hearth furnaces with a total daily capacity of 5,164 long tons; 4 converters with total capacity of 34 tons; and 29 electric furnaces with total capacity of 554 tons.

(d) Rolled and Drawn Steel.—Sixteen plants made hot rolled products, 1 made cold rolled shapes and 2 produced cold drawn shapes in 1932. Sales from these works were valued at \$12,564,130 as compared with \$27,279,916 in 1931. During the year 464,006 tons of iron and steel passed through the mills and 423,007 tons of this came from the producers' own works.

Table 126.—Principal Statistics of the Primary Iron and Steel Industry in Canada, 1927-1932

Year	No. of plants	Capital employed	Average number of employees	Salaries and wages	*Cost of materials at works	*Selling value of products at works	Value added by manufacturing
		\$		\$	\$	\$	\$
1927.....	36	96,295,734	7,396	11,809,198	18,993,940	45,571,264	26,577,324
1928.....	40	114,292,363	9,057	15,470,836	27,164,463	62,071,674	34,907,211
1929.....	45	109,446,529	11,218	18,534,681	32,514,596	72,231,995	39,717,399
1930.....	49	112,079,926	9,723	14,934,325	22,765,648	52,588,935	29,823,287
1931.....	53	104,512,104	8,026	11,072,054	15,291,414	36,911,245	21,619,831
1932.....	52	96,323,629	4,847	6,131,057	6,289,483	16,197,526	9,908,043

*Figures of materials used are of purchased materials only, and production figures cover sales only.

Table 127.—Principal Statistics of the Pig Iron and Ferro-Alloys, Steel and Rolled Products Industry in Canada, by Provinces, 1931 and 1932

Province	Year	Number of plants	Capital employed	Number of employees	Salaries and wages	*Cost of materials at works	*Production	Value added by manufacturing
			\$		\$	\$	\$	\$
Nova Scotia.....	1931	6	18,430,500	1,849	1,880,158	3,427,289	8,215,412	4,788,123
	1932	6	17,132,669	612	687,511	1,259,925	2,580,265	1,320,340
Quebec.....	1931	14	12,753,170	1,770	2,205,216	1,770,846	5,408,500	3,637,654
	1932	14	12,106,601	1,226	1,084,394	816,018	2,500,705	1,684,687
Ontario.....	1931	22	70,243,562	3,894	6,450,204	9,674,663	21,696,418	12,021,755
	1932	22	64,296,890	2,692	4,005,907	4,016,562	10,239,061	6,222,499
Manitoba.....	1931	4	1,826,872	341	348,875	268,808	999,268	730,460
	1932	4	1,738,369	235	280,283	154,662	627,065	472,406
Alberta.....	1931	3	1,130,000	122	125,600	116,881	444,600	327,719
	1932	3	966,800	59	51,098	27,673	189,610	161,937
British Columbia.....	1931	4	128,000	50	62,001	32,927	147,047	114,120
	1932	3	52,300	23	21,864	14,643	60,817	46,174
Canada.....	1931	53	104,512,104	8,026	11,072,054	15,291,414	36,911,245	21,619,831
	1932	52	96,323,629	4,847	6,131,057	6,289,483	16,197,526	9,908,043

*Figures of materials used are of purchased materials only, and production figures cover sales only.

Table 128.—Materials Charged to Iron Blast Furnaces in Canada, 1932

Item	Quantity	Cost of furnace
		\$
Foreign iron ore.....long tons	253,337	1,015,663
Mill cinder, scale, slags, etc.....long tons	16,297	39,638
Scrap.....long tons	4,145	27,397
Limestone—		
From Canadian quarries.....short tons	34,501	44,983
From foreign sources.....short tons	42,585	58,213
Coke—		
From Canadian coal.....short tons	37,984	226,005
From imported coal.....short tons	117,948	594,770
Imported coke.....short tons		
Total.....		2,006,669

Table 129.—Production and Sales of Pig Iron in Canada, by Grades, 1932

Item	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Pig Iron—				
Basic.....	105,058	83,586	1,041	19,921
Foundry.....	25,246	506	39,071	764,911
Malleable.....	13,826	5,164	15,328	303,700
Total.....	144,130	89,256	55,440	1,088,532

Table 130.—Production of Ferro-Alloys in Canada, 1923-1932

	Long tons		Long tons
1923.....	41,887	1928.....	44,482
1924.....	35,034	1929.....	89,116
1925.....	25,709	1930.....	65,223
1926.....	57,060	1931.....	46,764
1927.....	56,230	1932.....	16,161

Table 131.—Materials Used in the Steel Ingots and Direct Steel Castings Industry in Canada, 1932

Item	Companies' own production	Purchased materials	
		Quantity	Cost at furnace
	Long tons	Long tons	\$
(a) Metals:—			
Pig iron.....	102,862	4,089	82,045
Spiegeleisen and ferromanganese.....		3,878	202,410
Ferrosilicon.....		1,943	85,906
Other ferro-alloys.....			119,056
Metals for making alloy steels (nickel, etc.).....			36,215
Scrap iron or steel, including old rails not intended for re-rolling.....		171,009	1,591,137
Scrap made in works reporting.....	98,193		
Total metals.....			2,116,769
(b) Ores:—			
Crude iron ore—			
Foreign.....		7,779	55,943
Calcined, roasted, or treated ore—			
Foreign.....		61	2,393
Manganiferous ore—			
Foreign.....		746	12,242
Chrome, etc.—			
Canadian.....		1	8
Foreign.....		163	4,368
Total ores.....		8,750	74,954
(c) General materials:—		Short tons	
Limestone—			
Canadian.....		11,567	71,769
Foreign.....		16,139	23,008
Fluorspar.....		2,253	27,939
Dolomite.....		6,725	32,523
Coke made from Canadian coal.....		572	6,405
Coke made in Canada from imported coal.....		120	1,150
Imported coke.....		2,589	39,196
Anthracite coal.....		256	2,483
Bituminous coal.....		30	240
Charcoal.....		54	1,594
Electrodes.....			65,998
Moulding sands.....		6,372	41,045
Firebrick.....		756	31,279
Fireclay.....		1,563	16,558
Other materials.....			185,053
Total general materials.....			546,240
Total Value of Metals, Ores and General Materials used.....			2,737,963

Table 132.—Production of Steel Ingots and Direct Steel Castings and Sales by the Producers, 1932

Grades	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Steel Ingots—				
Basic open hearth.....	308,700	308,019	520	15,127
Electric.....	19,670	19,670		
Direct Steel Castings—				
Basic.....	2,616	565	3,048	483,898
Bessemer, including all converters.....	846	26	820	161,482
Electric.....	7,514	344	7,155	1,252,650
Total.....	339,346	328,624	11,543	1,913,157

Table 133.—Materials Used in Iron and Steel Rolling and Drawing Mills, 1932

Materials	Companies' own make	Purchased materials	
		Quantity	Cost at mill
	Long tons	Long tons	\$
Steel, crude and semi-finished (ingots, blooms, billets, slabs).....	417,020	15,303	579,870
Rails, old or scrap.....	809	17,729	212,385
Axles, scrap.....		1,400	22,439
Iron muck and scrap bar.....	1,137	22	1,256
Iron and steel scrap.....	2,101	7	28
All other iron and steel.....	1,940	427	22,224
Steel bars and rods for cold rolling or drawing.....		6,111	302,276
All other materials.....			101,414
Total.....			1,241,892

Table 134.—Products Made in the Iron and Steel Rolling and Drawing Mills, and Sales by the Producers, 1932

Products	Total tonnage made	Tonnage shipped to companies' own plants	Sales	
			Quantity	Value
	Long tons	Long tons	Long tons	\$
Blooms, billets and slabs (except for forging).....	220,576	196,434	12,464	412,049
Rails.....	45,090	22	46,220	2,123,150
Structural shapes.....	14,290	50	12,896	671,702
Merchant bars, including spring steel rounds, squares, flats (6 in. and under) except flats for cold rolling and bars for reinforcing concrete.....	53,422	7,143	48,439	2,524,587
Bars for reinforcing concrete.....	20,513	1,218	19,792	1,022,258
Wire rods, including chain rods.....	76,589	49,825	26,668	1,022,315
Spike rods, bolt and nut rods, horseshoe bars, and all other miscellaneous rolled (not forged) forms, not elsewhere specified.....	7,270	3,844	1,192	82,162
Cold rolled and cold drawn steel shapes.....	5,925		6,135	564,809
Rail fastenings, finished—				
Tie plates.....	7,047		6,982	353,714
Angle splice bars and fish plates.....	2,120		1,574	103,241
Forgings of iron or steel.....	6,223		6,080	488,542
Railway spikes and pressed spikes.....	2,331		2,517	178,154
Washers.....	276		262	36,604
Scrap iron and steel.....	1,617	214	1,078	4,507
Other products, including plain sheets, plates, galvanized sheets, horse-shoes, etc., for which figures cannot be shown separately.....				2,976,336
Total.....				12,564,130

Table 135.—Production of Pig Iron in Canada, by Provinces, 1927-1932

(Long tons)

Year	Nova Scotia	Ontario	Total
1927.....	249,549	460,148	709,697
1928.....	302,756	734,971	1,037,727
1929.....	310,801	769,359	1,080,160
1930.....	212,636	534,542	747,178
1931.....	101,393	318,645	420,038
1932.....	30,697	113,433	144,130

Table 136.—Production of Pig Iron in Canada, by Grades, 1927-1932

(Long tons)

Year	Basic	Foundry	Malleable	Total
1927.....	523,701	145,787	40,209	709,697
1928.....	724,559	233,386	79,782	1,037,727
1929.....	770,478	221,644	88,038	1,080,160
1930.....	494,231	193,074	59,873	747,178
1931.....	311,850	80,892	27,296	420,038
1932.....	105,058	25,246	13,826	144,130

Table 137.—Production of Pig Iron in Canada, by Months, 1930-1932

(Long tons)

Month	1930	1931	1932	Month	1930	1931	1932
January.....	87,079	35,592	10,305	August.....	57,459	23,212	5,992
February.....	70,600	46,395	10,507	September.....	49,395	17,585	5,709
March.....	74,582	57,110	17,989	October.....	40,079	11,562	6,731
April.....	72,339	53,792	16,898	November.....	46,360	14,292	14,149
May.....	80,505	50,511	13,339	December*.....	38,023	13,862	27,031
June.....	66,081	55,822	8,163	Total.....	747,178	420,038	144,130
July.....	64,676	40,303	7,317				

* Slight errors in monthly production figures have been compensated in December totals.

Table 138.—Production of Steel Ingots and Direct Steel Castings in Canada, by Kinds, 1927-1932

(Long tons)

Year	Steel ingots		Direct steel castings			Total steel ingots and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1927.....	868,440	134	17,569	2,191	19,611	907,945
1928.....	1,189,399	602	20,109	2,019	22,590	1,234,719
1929.....	1,295,162	14,444	35,806	2,590	30,022	1,378,024
1930.....	925,427	31,461	24,772	2,314	25,604	1,009,578
1931.....	612,437	25,017	14,760	590	19,305	672,109
1932.....	308,700	19,670	2,616	846	7,514	339,346

Table 139.—Production of Steel Ingots and Castings in Canada, by Months, 1930-1932

(Long tons)

Month	1930	1931	1932	Month	1930	1931	1932
January.....	115,200	57,598	25,060	August.....	57,626	52,491	26,710
February.....	106,612	82,637	28,469	September.....	55,808	33,390	23,139
March.....	117,487	99,341	43,572	October.....	65,431	30,926	17,102
April.....	102,681	91,461	36,030	November.....	71,740	28,337	37,088
May.....	99,312	75,235	29,239	December*.....	53,936	19,991	27,754
June.....	95,321	55,605	13,118	Total.....	1,009,578	672,109	339,787
July.....	68,424	45,097	27,506				

* Slight errors in monthly production figures have been compensated in December totals.

DOMINION BUREAU OF STATISTICS

Table 140.—World Production of Pig Iron, 1930-1932

(Including ferro-alloys)

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	6,192,400	3,772,600	3,574,000	Italy.....	578,314	544,825	487,091
Union of S. Africa.....	30,688	10,223	14,272	Yugoslavia.....	34,458	37,166	9,815
Canada.....	812,401	466,802	160,291	Luxemburg.....	2,433,852	2,020,672	1,929,232
India.....	1,179,868	1,072,702	913,680	Netherlands.....	268,411	252,662	232,692
Australia.....	(c) 440,000	(d) 129,000	(d) 228,000	Norway.....	142,549	116,960	96,156
New Zealand.....	8,075	3,460		Poland.....	470,399	341,632	195,536
Total.....	8,700,000	5,500,000	4,900,000	Roumania.....	67,756	25,485	(a)
FOREIGN COUNTRIES				U.S.S.R. (Russia).....	4,921,500	4,778,800	6,150,000
Austria.....	292,136	142,726	92,974	Spain.....	612,069	471,646	291,882
Belgium.....	3,312,091	3,147,285	2,739,500	Sweden.....	488,570	410,912	277,707
China.....	(a)	(a)	25,000	Mexico.....	56,913	52,090	20,059
Czechoslovakia.....	1,414,392	1,146,331	440,000	United States.....	31,752,169	18,426,354	8,781,453
Finland.....	10,215	12,134	13,455	Brazil.....	34,422	34,000	(a)
France—				Japan (b).....	1,168,000	919,000	1,014,000
Saar.....	1,882,240	1,491,495	1,328,180	Manchuria.....	343,892	337,000	335,000
Other districts.....	9,912,907	8,069,357	5,449,954	Korea.....	148,987	143,000	159,000
Germany.....	9,545,248	5,965,342	3,870,258	Philippine Islands.....	170	160	(a)
Hungary.....	253,164	157,109	65,234	Total.....	70,100,000	49,100,000	34,100,000
				World's Total.....	78,800,000	54,600,000	39,000,000

(a) Information not available.

(b) Including pig-iron produced at government and other steel works for conversion into steel.

(c) Figure of American Iron and Steel Institute.

(d) Production of Broken Hill Proprietary Co. Ltd., only.

Table 141.—World Production of Steel Ingots and Castings, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	7,325,700	5,202,600	5,261,400	Latvia.....	5,759	7,075	(a)
Union of South Africa (b).....	38,956	42,663	43,572	Finland.....	28,000	18,000	(a)
Canada.....	1,009,578	672,109	339,346	Yugoslavia.....	84,000	90,000	(a)
India.....	618,922	625,148	569,810	Norway.....	3,122	1,802	(a)
Australia.....	(c) 420,000	(d) 143,000	(d) 255,000	Luxemburg.....	2,234,042	2,002,814	1,924,688
Total.....	9,400,000	6,700,000	6,500,000	Poland.....	1,217,952	1,020,589	542,056
FOREIGN COUNTRIES				U.S.S.R. (Russia).....	5,706,600	5,330,000	5,800,000
Austria.....	460,314	317,266	201,284	Spain.....	909,932	635,174	523,995
Belgium.....	3,301,196	3,056,049	2,764,626	Sweden.....	601,177	530,453	519,935
Czechoslovakia.....	1,788,509	1,490,159	670,000	Mexico.....	111,929	84,162	57,215
France—				United States.....	40,699,483	25,945,501	13,681,162
Saar.....	1,904,237	1,514,050	1,440,316	Japan.....	2,289,483	1,834,660	2,323,200
Other districts.....	9,297,366	7,698,095	5,550,957	China (estimated).....	30,000	30,000	30,000
Germany.....	11,191,422	8,087,911	5,535,254	Brazil.....	20,366	(a)	(a)
Hungary.....	363,554	311,297	177,000	Roumania.....	159,245	111,469	(a)
Italy.....	1,715,817	1,387,090	1,374,129	Total.....	84,100,000	61,400,000	43,300,000
				World's Total.....	93,500,000	68,100,000	49,800,000

(a) Information not available.

(b) Including rails, fishplates, etc.

(c) Figure of American Iron and Steel Institute.

(d) Production of Broken Hill Proprietary Co. Ltd., only.

LITHIUM

Metallic lithium when alloyed with magnesium in the proportion of 3 parts to 7 lithium produces an alloy of specific gravity of 1.4 and very light alloys of these two metals have recently been produced for aeronautical purposes. Recent research in Germany has resulted in the production of a series of beryllium lithium alloys which are stated to have industrial application. The specific gravity of these alloys ranges from 1 to 1.5 and they contain 26 to 65 per cent of lithium.

Prices for lithium, December, 1932, were: metallic lithium, f.o.b. New York, 98 to 99 per cent, 100 pound lots \$15 per pound. Lepidolite per ton \$50 to \$55 for ordinary grades, nominal.

MAGNESIUM

In the manufacture of metallic magnesium, especially selected calcined magnesite was formerly employed by one American company, but now the metal is made from magnesium chloride, both in the United States and other countries.

No metallic magnesium was reported as being produced in Canada in 1932. Magnesium Development Company, an organization to develop and utilize magnesium, was recently formed by the Aluminum Company of America and the German I. G. Farbenindustrie, according to "Metal and Mineral Markets". The I. G. Company has extensive interests in the German Aluminium Werke and controls Elektron-Metal, manufacturer of elektron, a series of high magnesium alloys.

The low specific gravity of magnesium, 1.74, makes it of special value in the automotive and aircraft industries. Other important uses are in flashlight powders and in pyrotechnics, in organic reduction processes and as a deoxidizer for other metals, especially in the manufacture of nickel and copper alloys.

The United States Bureau of Mines reports the quantity of magnesium ingot sold or used in the United States in 1932 at 791,699 pounds valued at \$228,653 representing an increase of 36.3 per cent in quantity and 14.5 per cent in value as compared with 1931. In 1932 as in the four preceding years, the United States output of primary magnesium was all obtained from magnesium chloride recovered as a joint product of salt wells near Midland, Michigan. The price quoted on ingot magnesium (4 x 16 inches) remained, in 1932, at 30 cents a pound in carloads and 32 cents per pound in 100-pound lots or more.

MANGANESE

The importance of manganese in the manufacture of iron and steel is generally increasing; a large part of the consumption is in the manufacture of manganese-iron alloys (spiegeleisen and ferromanganese) for the making of special steels.

Chief sources of manganese and the largest known deposits are in Russia (Caucasus), Southern and Central India and East Central Brazil. It also occurs in commercial quantities in several countries of Europe, and in Canada, the United States, Cuba, Mexico and Australia.

There was no mining of manganese ores reported in the Dominion for 1932. The manganese deposits at Turtle Creek, New Brunswick, were not operated in 1932 and the property passed through a receivership. The new Ross manganese syndicate reports that high grade pyrolusite concentrates were produced from ore dumps on the property located at New Ross, Lunenburg county, Nova Scotia.

Low operations in the steel industry, upon which the market for manganese is mainly dependent, were reflected in the drastic reductions in United States shipments and imports of manganese ore in 1932. Imports of manganese oxide into Canada fell from 53,106,000 pounds valued at \$258,257 in 1931 to 3,024,000 pounds worth \$87,644 during 1932. The greater part of the 1931 imports came from the Gold Coast whereas in 1932 the United States supplied practically the total quantity.

Prices for December, 1932, were as follows: manganese (usually sold as ferromanganese) f.o.b. New York, 42 cents per pound, 95 to 97 per cent. Manganese ore per long ton unit of Mn., c.i.f. North Atlantic ports, cargo lots, exclusive of duty, Brazilian, 46 to 48 per cent Mn., 18 cents; Chilean, 47 per cent minimum, 20 cents nominal; Indian, 48 to 50 per cent, 20 to 21 cents; Caucasian, 52 to 55 per cent, 22 cents nominal; South African, 52 to 54 per cent, 20 to 21 cents. Chemical grades, per ton in car lots, powdered, coarse or fine, minimum 80 per cent MnO₂, Brazilian or Cuban, \$50 in cars to \$60 barrelled. Domestic, 70 to 72 per cent, \$43 to \$50 in carloads, f.o.b. mines.

Table 142.—Production of Manganese Ore in Canada, 1922-1932

Year	Tons	Value
1922.....	73	\$ 2,044
1923.....	200	1,400
1924.....	584	4,088
1925-29.....		
1930.....	273	1,356
1931.....	117	2,893
1932.....		

Note.—For years 1886 to 1921 see previous reports.

Table 143.—World Production of Manganese Ore, 1930-1932

(Supplied by Imperial Institute)
(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Gold Coast (exports).....	417,490	247,191	50,689	Portugal.....		266	
Northern Rhodesia.....	873	1,467		U.S.S.R. (Russia).....	1,543,362	(a)	(a)
Union of South Africa.....	144,994	100,290		Spain.....	16,553	17,633	2,550
Canada.....	244	104		Sweden.....	8,542	8,232	4,653
India.....	829,946	537,844	212,604	Egypt.....	119,297	100,174	322
Unfederated Malay States..	20,696	8,683	9,278	Morocco (French zone)....	15,907	11,320	4,000
Australia.....	125	13	106	Cuba.....	977	6,491	2,113
Total.....	1,410,000	900,000	270,000	Porto Rico (exports).....	2,536	2,374	2,302
FOREIGN COUNTRIES				Mexico.....	720	719	301
Austria (b).....	25,176	11,298	6,480	United States (c).....	67,035	39,242	17,777
Czechoslovakia.....	83,874	82,558	32,951	Argentina.....	236	218	243
France.....	2,018	325	(a)	Brazil.....	159,478	142,731	19,979
Germany.....	2,312		12	Chile.....	6,040	377	441
Greece.....	645	301	(a)	China.....	70,700	24,000	21,500
Hungary.....	8,946	1,114	1,473	Japan.....	(a)	2,871	5,333
Italy.....	10,465	6,320	372	Netherlands, East Indies..	16,426	14,311	8,156
Yugoslavia.....	1,515	2,414	(a)	Turkey.....	900	1,000	2,800
Roumania.....	32,998	18,490	4,971	Total.....	2,200,000	(a)	(a)
				World's Total.....	3,600,000	(a)	(a)

(a) Information not available.
(b) Manganese content of manganese ore and manganiferous iron ore.
(c) Shipments, excluding ore containing 10 to under 35 per cent mn, which is included with iron ore, as follows:—
1930..... 77,417 long tons
1931..... 64,062 “
1932..... 15,635 “

MERCURY

Cinnabar, the most important ore of mercury, is found in many places throughout the world but the chief producing countries are Italy, Spain and the United States in order of their importance.

Recent uses for mercury include its employment in the construction of neon lights and its adoption in the making of artificial silks. It is also utilized in the manufacture of automatic switches for electrical devices, radio tubes, explosives, storage batteries and as a fertilizer for grass. The mercury boiler is another potential consumer; mercury heated in one boiler is used first like steam to drive a turbine and then exhausted for recovery by condensation. Considerable quantities of the metal are used for the amalgamation of gold in auriferous quartz ores.

There has been no reported production of new mercury in Canada since 1897. Previous to this a small amount of quicksilver was recorded as having been produced in British Columbia from a property situated on the north shore of Kamloops lake. Imports of quicksilver into Canada during 1932 totalled 43,230 pounds valued at \$37,068 as compared with 21,159 pounds worth \$25,454 in 1931. Prices for December, 1932, were New York, per flask of 76 pounds, \$48 to \$49. London, 10 pounds, 17 shillings, 6 pence.

Table 144.—Production of Mercury in Canada, 1895-1932

Year	Flasks	Price per flask	Value
1895.....	71	\$ 33.00	\$ 2,348
1896.....	58	33.44	1,940
1897.....	9	36.00	324
1898-1932.....			

Table 145.—Imports into Canada of Mercury, 1925-1932

Year	Pounds	Value
1925.....		\$ 118,697
1926.....	146,435	84,910
1927.....	100,492	160,330
1928.....	124,099	269,746
1929.....	199,603	478,048
1930.....	346,701	153,837
1931.....	105,755	25,454
1932.....	21,159	37,068
	43,230	

Table 146.—World Production of Mercury, 1930-1932

(Supplied by Imperial Institute)

(Pounds)

Country	1930	1931	1932
BRITISH EMPIRE			
New Zealand.....	4,040	34,200	
FOREIGN COUNTRIES			
Austria.....	6,217	998	2,200
Czechoslovakia.....	156,570	168,927	99,248
Italy.....	4,261,281	2,861,679	2,240,000
U.S.S.R. (Russia) (years ended Sept. 30).....	250,000	(a)	(a)
Spain.....	1,480,803	1,503,843	1,797,978
Algeria.....	48,500	82,000	90,041
Mexico.....	375,941	554,183	557,176
United States.....	1,638,028	1,895,972	959,272
Chile.....	152	(a)	(a)
Turkey.....	40,875	17,925	(a)
Japan.....	9,208	7,725	5,256
China.....	56,000	49,000	(a)
Korea.....	1,946	3,085	(a)
Roumania.....		551	168
Bolivia (exports).....	74,834	77,596	(a)
World's Total.....	8,400,000	(b) 7,300,000	(b) 5,900,000

(a) Information not available.

(b) Excluding U.S.S.R. (Russia).

MOLYBDENUM

No molybdenite ores or concentrates were produced in Canada in 1932. The Department of Lands and Mines of the province of New Brunswick reports that early in the spring of 1932 molybdenite and wolframite were discovered near Welsford, Queens county; the property was actively explored during the year. Another molybdenite prospect, about nine miles southwest of Bathurst, N.B., was also investigated. Molybdenite also occurs in Nova Scotia, Quebec, Ontario, Manitoba and British Columbia. Deposits in Quebec and Ontario have yielded commercial outputs during past years.

It is reported that the first concentration plant for molybdenite in the U.S.S.R. was started up at Tschikoiskoje on July 2, 1933. It is the hope of the Soviet Union that the capacity of this plant will be large enough to obviate the need of Russia importing the material.

Production of molybdenum ore in the United States during 1932 amounted to 363,400 short tons which yielded 2,616 short tons of concentrates carrying an average of 85.21 per cent or 4,458,000 pounds of molybdenum sulphide (MoS₂), equivalent to 2,675,000 pounds of metallic molybdenum. The United States Bureau of Mines states that two American mines (at Climax, Lake county, Colorado, and in Taos county, New Mexico) and a mine at Knaben, east of Stavangen, Norway, produce all but 2 or 3 per cent of the world's molybdenum.

It is stated that the known reserves of molybdenum ore at Climex, Colorado, were about 80,000,000 tons with an average of about 9 pounds recoverable molybdenum per ton. A concentrate of about 90 per cent molybdenum sulphide is produced in the Colorado mill and is exported without further processing or shipped to the Pittsburgh plant where it is converted into ferro molybdenum, calcium molybdate, or metallic molybdenum. Ratio of export to domestic consumption is about 3 to 1.

The use of molybdenum in forged and rolled steels has been well established for some time, but more recently it has proved a valuable addition with either nickel, chromium or manganese for cast steels, according to "Chemical Age". A new application of molybdenum which is now definitely on its way is a high-grade structural steel.

Imports of calcium molybdate into Canada, for steel making, during 1932 amounted to 14,219 pounds valued at \$5,365 as compared with 34,326 pounds worth \$11,481 in 1931.

Prices in December, 1932, for molybdenum ores delivered at Pittsburgh, Pa., were nominally 42 cents per pound of contained MoS₂ for 75 to 85 per cent concentrate. London, per long ton unit, nominal at 42s. for 80 to 85 per cent concentrate.

Table 147.—Production of Molybdenite in Canada, 1920-1932

Year	Ores mined	Ores treated	Ores and concentrates shipped		MoS ₂ content of shipments	MoS ₂ production (probable recovery)	
	Tons	Tons	Tons	Value (a) \$	Pounds	Pounds	Value (b) \$
1920-1923.....							
1924.....	700	668	10.0	9,370	18,739	18,739	9,307
1925.....	3,000	2,779	15.3	11,176	22,350	22,350	11,176
1926.....	4,186	4,490	12.6	10,472	20,943	20,943	10,472
1927.....							
1928.....							
1929.....	9,100	2,900	9.5	6,400	16,150	16,150	6,400
1930.....							
1931.....	12	12	0.61	280	1,222	1,222	280
1932.....							

(a) Value as given by the operators. (b) Estimated at the average market value of molybdenite.
NOTE.—For years 1902 to 1919 see previous reports.

Table 148.—World Production of Molybdenum Ore, 1930-1932

(Supplied by Imperial Institute)
(In cwt.—112 pounds of concentrates)

Country	1930	1931	1932
BRITISH EMPIRE			
Canada (MoS ₂).....		11	
Australia.....	105	11	102
FOREIGN COUNTRIES			
Austria.....	5		
Norway (MoS ₂ content).....	4,193	4,390	5,181
French Morocco (ore).....	200		
United States (MoS ₂ content).....	55,402	46,616	39,804
Korea.....	520	433	(a)
China.....	100	(a)	(a)
Mexico.....		112	108

(a) Information not available.

RADIUM-URANIUM

No radium or uranium chemical products were commercially produced in Canada in 1932. Eldorado Gold Mines Ltd. shipped hand cobbled ore from its property at Great Bear Lake, North West Territories; this was consigned to the company's new radium extraction plant located at Port Hope, Ontario. This plant is expected to market finished products in 1933; the company is also conducting extensive development work at the mine. Other mining operators in the Great Bear Lake district included Bear Exploration and Radium Ltd., Consolidated Mining and Smelting Co. of Canada, Ltd., and Great Bear Lake Mines, Ltd.

In Ontario the International Radium and Resources Ltd. conducted development work on radium bearing deposits situated at Wilberforce, Haliburton county; small quantities of the ore were utilized for experimental purposes. Development work consisting of shaft sinking, crosscutting and drifting was carried out at Cheddar, Ontario, by Canadian Radium Mines, Ltd.

Early in 1932 the radio-active area on Quadra Island in Nanaimo Mining division, British Columbia, was covered by sixteen mining claims; an electroscopic survey was later conducted. Small seams of carnotite were found on the surface varying from a knife-edge blade seam to a couple of inches in thickness. No development work was done in 1932.

Union Minière du Haut Katanga in its annual report states that the plants for the production of radium were operated on a reduced scale in 1932; during 1932 it was reported that pitchblende had been discovered in the Nanyuki district of Kenya.

According to figures supplied by the American Society for the control of cancer, which are recognized to be only relatively complete, the total amount of radium owned in quantities of 75 milligrams and over in the United States is 85,228 milligrams. The hospitals owning 75 milligrams and over number 135. The 135 hospitals own 68,033 milligrams. The individuals owning 75 milligrams and over total 47, with a total of 6,945 milligrams. The United States Bureau of Mines states that the total production and imports of radium into the United States to the end of 1930 have been in the neighbourhood of 288.4 grams and that in 1932 only two countries were producing significant quantities of radium—the Belgian Congo at Chinkolobwe, Katanga, and Czechoslovakia at Jachymov. The 1932 productive capacity of the Oolen works of the Société Métallurgique de Hoboken was about 6 grams of radium monthly. The price in 1932 fluctuated between \$60 and \$70 per milligram. The Belgian Congo now produces annually about 60 grams and Czechoslovakia, 3.5 grams of radium.

The value of radium imports into Canada during 1932 amounted to \$45,107 as compared with a value of \$207,735 in 1931.

Table 149.—World Production of Uranium Minerals, 1930-1932

(Supplied by *Imperial Institute*)

(Cwt. 112 pounds)

Country	1930	1931	1932
Czechoslovakia (U ₃ O ₈).....	259	309	376
Portugal.....			645
Madagascar.....		8	
United States (U ₃ O ₈).....	(a)	11	(a)
Belgian Congo.....	(i)	8,149	(i)

Uranium minerals are also produced in Russia. The production as recorded in 1927 was about 50 tons; later information is not available.

(a) Information not available.

(i) The output of uranium minerals is not available for these years but it is reported that radium produced from these ores amounted to 60, 40 and 6 grams in 1930, 1931 and 1932 respectively. This production of radium represents the greater part of the world's supplies.

SELENIUM AND TELLURIUM

Selenium is obtained as a by-product in copper refining and was produced for the first time in Canada early in 1931 at the plant of the Ontario Refining Co. Ltd., at Copper Cliff, Ontario. No production of selenium was reported in Canada for 1932. There were, however, 8,600 pounds valued at \$17,200 produced in Ontario during the first six months of 1933.

The addition of selenium in chromium steels is claimed to possess several advantages over sulphur as a free-cutting agent. Selenium steel, it is claimed, is easier to roll and forge than high-sulphur types, and can be drilled, tapped, threaded, and otherwise machined with ordinary tools and practice. The chief consumer of selenium is the glass industry where it is employed as a decolorizer and in the manufacture of ruby glass. In recent years it has been used successfully in rubber compounding as it increases the resistance of the rubber to abrasion by 50 to 80 per cent. With the development of television selenium cells have been greatly improved and the lack of uniformity and high inertia of the earlier types of cells have been corrected.

Tellurium occurs in some of the Canadian metalliferous ores. Its recovery, however, on a commercial scale has not yet been effected in Canada. Electroplaters are using a solution of tellurium chloride as a dip for silverware when a dark finish is wanted. Tellurium is sold in 1-5 or 10 pound cakes analysing 98 to 99 per cent tellurium with selenium as the chief impurity; it is also furnished in powdered form if desired.

The principal source of selenium and tellurium is in the anode slime produced in the electrolytic copper refineries and both are recovered in the process of extracting the precious metals from this slime. Selenium prices, December, 1932, New York, \$1.80 to \$2.00 per pound, depending on quantity, for black, powdered, 99.5 per cent pure; tellurium, \$2.00 per pound.

TANTALUM

Tantalum is considered a rare element, the principal ore of tantalum, tantalite, has been produced principally in western and northern Australia. This mineral together with columbite also occurs in Renfrew county, Ontario. Tantalum in 1932 was quoted at \$91 per kilo for C.P. bar or sheet.

A new cutting agent has been developed by the Vanadium Alloy Steel Company; a mixture of tantalum and columbium monocarbides cemented under pressure by tungsten or molybdenum seems to be particularly effective. The Pilbarra field of western Australia, the chief source of the metal, reported an output of 10 long tons of tantalite in 1932 valued at £2,684. In 1931 6,288 pounds of tantalum ore were imported into the United States in addition to which there was a domestic production of 700 pounds of columbite, which contains tantalum as well as columbium. (Mineral Industry.)

TIN

Tin ores are not mined in Canada. The metal is known to occur in the Snowflake and Sullivan mines in British Columbia and in certain pegmatites in southeastern Manitoba. It is also found near New Ross in Nova Scotia. "Chemical Age" reports that the International Tin Committee has taken steps to set up a Tin Research and Development Council for the purpose of stimulating consumption. This Council will endeavour to open up new outlets for the metal and consolidate existing markets, and in this work it will be assisted by the governments of the principal tin-producing countries of the world—Malaya, Bolivia, Dutch East Indies, Nigeria and Siam. A special Research and Development Committee has also been set up in the United States to work in close co-operation with the International Council.

The principal tin consuming industries are food packing and automobile manufacturing. Tin-bearing alloys, tinplate clippings, and melting pot drosses are the most important materials from which secondary tin is reclaimed. Most of the tin recovered from alloys does not pass through a refined tin stage but is made into alloys which are brought to the required specifications by the addition of virgin metals.

The average New York price for straits tin in 1932 was 22.017 cents per pound. London standard, spot, 135.848 pounds per long ton.

Table 150.—Available Statistics on the Consumption of Tin in Specified Canadian Manufacturing Industries, 1930-1932

Industries	Items (used)	1930	1931	1932
		Pounds	Pounds	Pounds
Brass and copper products.....	Tin castings.....	111,000	66,000	66,000
Brass and copper products.....	Tin ingots and bars.....	234,000	161,000	117,000
Brass and copper products.....	Tin plates, slabs and sheets.....	32,000	35,000	33,000
Brass and copper products.....	Tin scrap.....	19,000	30,000	31,000
White metal alloys.....	Pig tin.....	2,755,000	2,360,000	2,247,000
Iron and steel.....	Tin.....	967,000	2,058,000	1,105,000
Grand Total		4,118,000	4,710,000	3,599,000

Table 151.—Imports into Canada of Tin, 1930-1932

	1930		1931		1932	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Tin in blocks, pigs and bars.....	5,273,700	1,757,494	4,125,800	1,067,395	3,148,400	809,437
Tin foil.....	74,470	35,633	27,167	12,095	6,749	3,293
Strip waste.....			304,000	1,615	1,884,000	6,850
Collapsible tubes.....		61,464		62,889		67,810
Tin plated kitchen and dairy hollow-ware, not painted or decorated.....		104,010		65,552		72,445
Manufactures of tin plate, painted, japanned, decorated or not, and manufactures of tin, n.o.p.....		936,242		983,897		723,511
Tin cans and containers for food.....		555,907		80,493		126,418
Bichloride of tin or tin crystals.....	785,875	181,704	945,832	177,166	1,185,483	189,128
Total		3,632,454		2,451,162		1,998,892

Table 152.—World Smelter Production of Tin, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932
BRITISH EMPIRE			
United Kingdom (estimated).....	47,300	35,600	28,500
British Malaya (b).....	96,972	87,514	49,945
Australia.....	1,544	1,690	1,958
Total	146,000	125,000	80,000
FOREIGN COUNTRIES			
Belgium (estimated).....	700	200	800
France.....	547	700	250
Germany.....	2,805	3,689	1,871
Italy.....	87	8	7
Netherlands (estimated).....	2,000	3,000	3,500
Portugal.....		61	74
China.....	6,256	5,891	7,890
French Indo-China.....	283	67	
Japan.....	773	999	987
Netherlands East Indies (exports).....	14,359	12,788	8,091
Norway.....	(a)	196	242
Mexico.....		12	(a)
Total	28,000	28,000	24,000
World's Total	174,000	153,000	104,000

Secondary tin recovered in the United States (as metal, in alloys, and in chemical compounds), was as follows:—

1930.....	23,393 long tons
1931.....	17,679 "
1932.....	13,170 "

(a) Information not available.

(b) Exports plus difference between "carry-over" at end and beginning of the year.

TITANIUM

The minerals rutile and ilmenite constitute the chief ores of titanium. Important deposits of these minerals occur near Baie St. Paul, Quebec; titaniferous ores have been exported from this district for some years. There was, however, no production of titanium ores in Canada during 1932.

"Chemical and Metallurgical Engineering" remarks that among the pigments perhaps the rise of titanium dioxide has been the leading development in 1932. National Lead's subsidiary, Titanium Pigment Corp., pioneered the development in the United States prior to the depression but the broadest application has come in recent years. Commercial Pigments Co. had its start in 1928 and the Vanadium Corporation entered the field in 1932.

Titanium pigments are chiefly used for paint making, sometimes in conjunction with other pigments and are usually employed combined with precipitated barium sulphate. A new plant for the manufacture of titanium pigments was inaugurated in May, 1933, at Luton, England. The barium sulphate used in the Luton plant is produced from British barytes.

One of the largest factories for titanium compounds in Europe is that of the Bovisa works at Milan, Italy. This plant has a production capacity of about 2,000 short tons per year of which two-thirds are exported to other European countries. The pigment is manufactured from ilmenite which has a maximum titanium oxide content of between 40 and 50 per cent.

It is reported in the "Chemical Trade Journal", London, that the Russian Soviet is displaying increased interest in the exploitation of rare elements and titanium ores are being given special attention. Enormous deposits of ferrotitanium ores in the Urals have not yet been utilized, but the "Lakokraska" trust is arranging for the construction of a new plant for the production of titanium white; the same Journal states that the refining plant of Titanium Products Proprietary in Brooklyn near Melbourne, Australia, is completed, and the production of titanium oxide from the ilmenite deposits on King Island, 150 miles from Melbourne, will be commenced in 1933.

It is interesting to note that during the last eight years the production in the United States has reached 75,000 tons of pigment per annum containing 25 per cent of titanium oxide. This output, according to "Chemical Age", is still increasing as compared with other pigments.

It is reported that the use of titanium as an alloying element in austenitic steels, as well as for deoxidation and scavenging, is increasing.

In 1932 India produced 50,053 long tons of ilmenite and Norway 13,268 tons, 30 tons of rutile were also produced in the latter country. Figures for production of titanium minerals in the United States are not available.

Consumption of titanium white in Canada during 1931 totalled 745,207 pounds valued at \$89,761. Prices for titanium ore, December, 1932, ilmenite, 45 to 52 per cent, TiO_2 , f.o.b. Atlantic seaboard, \$10 to \$12 per gross ton, according to grade and impurities. Rutile per pound guaranteed minimum 94 per cent concentrate, 10 cents.

TUNGSTEN

Tungsten is employed in the manufacture of alloy steels, electric light filaments, tools and many other metal products.

Tungsten minerals have been found in widely separated districts in the Dominion. Deposits in Nova Scotia and New Brunswick appear to possess the greatest economic possibilities. Comparatively small shipments of tungsten ores were made in 1912 and 1917; since then no production has been recorded in Canada. During 1932 the Indian Path Mines, Ltd., conducted some underground development and installed equipment at its tungsten property at Indian Path, Lunenburg county, Nova Scotia.

Early in 1932 wolframite was discovered near Welsford, Queens county, New Brunswick; considerable exploratory work was later carried out on the occurrence.

According to the United States Commercial Attache at Shanghai, the provincial government of Kiangsi, China, world's principal producer of tungsten and leading Chinese source, is planning again to institute a provincial monopoly of tungsten deposits in that province.

Imports of chromium metal and tungsten metal in lumps, powder, ingots, blocks, etc., when imported into Canada exclusively for alloying purposes, amounted to 158 pounds valued at \$7,967 in 1932 as compared with 7 pounds worth \$394 in 1931.

Imports of metallic elements and tungstic acid for use only in the manufacture of metal filaments for electric lamps amounted in value to \$59,109 as against a value of \$88,054 during 1931.

Prices for tungsten ores, December, 1932, were: New York, per unit of WO_3 , Chinese wolframite, \$9.50 to \$9.85, duty paid. Bolivian scheelite, \$9.50 nominal. Domestic, \$8 to \$10.

Table 153.—World Production of Tungsten Ore and Concentrates, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom—				Portugal—			
Concentrates.....	128	100	2	Concentrates.....	464	257	257
Southern Rhodesia—				Spain—			
Concentrates.....	35	21	13	Concentrates.....	231	129	39
Union of South Africa—				Mexico—			
Concentrates.....		2		Concentrates.....	25		
India—				United States—			
Concentrates.....	2,452	2,248	2,023	Concentrates.....	627	1,254	354
Federated Malay States—				Argentina—			
Wolfram.....	65			Concentrates.....	90	19	6
Scheelite.....	784	368	302	Bolivia—			
Unfederated Malay				Concentrates.....	838	402	671
States—				China—			
Wolfram.....	195	193	129	Ore.....	6,736	2,970	2,180
Australia—				French Indo-China—			
Wolfram.....	201	80	44	Tin-tungsten concentrate	198	244	218
Scheelite.....	6	4	(12 cwt.)	Japan—			
New Zealand—				Scheelite.....	73	51	20
Scheelite.....	24			Korea—			
FOREIGN COUNTRIES				Concentrates.....	11	(a)	(a)
Czechoslovakia—				Netherlands East Indies—			
Concentrates.....	54	12	(a)	Ore.....	30	1	
Tin-tungsten concentrates	38	10	(a)	Siam (exports)—			
				Ore.....	6	10	

(a) Information not available.

VANADIUM

No vanadium ores are produced in Canada. The metal, however, is known to occur in association with magnetite deposits located in the Rainy River district of Ontario. Vanadium production during recent years has been practically restricted to the ores from Minasragra, Peru; the oxidized metallic minerals from Broken Hill, Northern Rhodesia, and from the vicinity of Oturu, South West Africa, and the Roscoelite and related minerals of Western Colorado and Southeastern Utah, U.S.A. The U.S.S.R. reports that the Kuza titanomagnetite deposits in the Urals, which contain vanadium, are being prepared for mining operations.

Vanadium is used for the making of tough steels and the United States Bureau of Mines states that its use would undoubtedly increase much faster if the price could be lowered. The metal is also employed in the chemical industries, especially as a catalyst in the production of sulphur trioxide.

The price of vanadium ore at the close of 1932 was 26 cents a pound, V_2O_5 , contained, f.o.b. shipping point.

Table 154.—World Production of Vanadium Ores, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932
BRITISH EMPIRE			
Northern Rhodesia—Oxide.....	98	268	363
Concentrates.....		705	1,204
South West Africa.....	4,461	4,602	2,973
FOREIGN COUNTRIES			
Peru (V content).....	440		
France.....	70	84	(a)

(a) Information not available.

Vanadium ores are also produced in the United States.

CHAPTER SIX

THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

An increase in the production of Canadian ores containing the non-ferrous metals has stimulated an expansion in the domestic smelting and refining of these metals. Abundant water power, conveniently located in regard to the mining districts, has made possible the generation of electric energy at such low cost that the utilization of electrochemical or electrothermic processes has been adopted for many metallurgical purposes. Some of the more important of these applications include the electrolysis of alumina and the production of aluminium in various forms in Quebec, the production of electrolytic copper at Montreal East; the refining of nickel and copper in central Ontario and the manufacture of refined zinc in Manitoba and British Columbia. Electrolytic lead is produced at Trail, British Columbia, by the Consolidated Mining and Smelting Company. Electric furnaces are also used throughout the world in the production of abrasives, ferro-alloys, titanium products, magnesium, beryllium, iron, ferro-silicon, carbides and cyanamide.

As a source of power, electric energy is being used to an ever increasing extent in mining and milling operations where important economies in operation are being effected.

In the extraction and treatment of ores, the mining and milling are so closely associated that it is impossible to make a separation of the statistics of these two operations. There is less difficulty in drawing a line between mining and milling on the one hand, and smelting and refining on the other, though there are cases where mining, milling and smelting operations are so closely related that it is not feasible to separate the figures on capital employed. In cases such as these the figures on capital employed have been included with the smelting industry. This chapter is devoted to a consideration of the smelting and refining industry in Canada as it applies to the ores of the non-ferrous metals.

Quebec.—The Shawinigan reduction and fabricating plants of the Aluminum Company of Canada, Ltd., were in continuous operation throughout 1932. At the former plant aluminium pig was produced from alumina imported from the United States; aluminium ingot, aluminium wire and other fabricated aluminium products were produced in the latter plant. At Arvida the slag ore plant of the same company was not operated in 1932; aluminium pig was manufactured from imported alumina in the reduction works—this plant operated throughout the year.

Noranda Mines Limited treated 918,567 tons of ore, concentrate and refinery slag and produced 63,422,518 pounds of anodes, the average analysis of which was 99·36 per cent copper, 10·76 ounces gold, and 19·54 ounces silver per ton.

Ore Treated and Smelter Production at Noranda Mines, 1927-1932

Year	Tons of ore, concentrate and refinery slag smelted	Pounds of fine copper produced	Gold produced, ounces	Silver produced, ounces
1927.....	10,740	552,345	767	2,644
1928.....	271,926	33,065,261	52,949	186,277
1929.....	428,221	51,223,115	68,732	334,279
1930.....	734,072	75,509,373	117,393	691,920
1931.....	765,544	62,859,355	253,363	558,801
1932.....	918,567	63,013,485	341,350	619,597

Canadian Copper Refiners Limited, a subsidiary of Noranda Mines, operated their plant at Montreal East, P.Q., continuously during 1932. This electrolytic refinery treated blister and anode copper produced at the Noranda smelter together with blister received from the Hudson Bay Mining and Smelting Co. Ltd., of Flin Flon, Manitoba. The company also refined scrap or other secondary copper. Preparations were made for enlarging the precious metal division of the refinery. Shipments of refined copper were made in 1932 to points in Canada and to the United States, England, France, Belgium, Germany, Sweden, Holland and Italy.

Ontario.—The International Nickel Company of Canada, Ltd., reported sales of nickel in all forms, including nickel in alloys, to be 34,406,953 pounds compared with 55,739,047 pounds in 1931, a decrease of 38 per cent. Copper sales, inclusive of copper sulphate produced in Wales, decreased from 96,919,677 pounds to 57,662,789 pounds or 41 per cent. Gold sales were 23,042 ounces, silver sales 652,638 ounces, and sales of platinum metals, 19,300 ounces. At the Copper Cliff smelter of the company three reverberatory furnaces were operated until the end of March after which two furnaces were used for the remainder of the year. This smelter treated 336,215 tons of dry concentrates and produced 27,033 tons of bessemer matte and 27,770 tons of blister copper. The Orford process plant was started at Copper Cliff in March, 1932, and treated 11,370 tons of bessemer matte, producing 6,651 tons of matte for refining at Port Colborne and 2,249 tons of blister copper.

Falconbridge Nickel Mines Ltd., reported its smelter at Falconbridge, Ontario, in operation a total of 341 days during the year. The average grade of ore smelted contained 2·50 per cent nickel and 1·04 per cent copper. Production of refined nickel in the Norwegian refinery of the company totalled 5,408,373 pounds, sales aggregated 7,844,648 pounds. The following are data covering the operation of the Canadian smelter in 1932:—

Ore smelted.....	123,306 short tons
Matte produced.....	4,947·6 short tons
Nickel produced in matte.....	2,908·17 short tons
Copper produced in matte.....	1,196·63 short tons
Metals per ton in ore.....	50·17 lbs. ni.—20·91 lbs. cu.
Metallurgical losses per ton of ore.....	3·0 lbs. ni.—1·5 lbs. cu.

On September 1st, 1932, authorization was granted to commence work on foundations for a 250 ton concentrator, sintering plant, smelter extension and the necessary additions to the crushing plant and ore bins to effect increased capacity. The new plant was expected to be in operation in April, 1933.

The Deloro Smelting and Refining Co. Ltd., with metallurgical works located at Deloro, Hastings county, Ontario, and specializing in the treatment of cobalt-silver-arsenic ores reports continuous operations in 1932. The smelting and refining units of this plant operated on ores mined in Northern Ontario. Shipments comprised silver bullion, arsenic, arsenate of lime, cobalt oxide, cobalt metal, mixed oxides, nickel oxides, and silver-lead-bismuth bullion. Silver and arsenic were first produced in this plant in 1907 while black and grey cobalt oxides were first marketed by the company in 1911; mixed nickel and cobalt oxides were first made at Deloro in 1910.

In January, 1933, Eldorado Gold Mines Ltd. completed and placed in operation its radium refining plant at Port Hope, Ontario. The principal products will consist of radium, uranium salts and black oxide and silver. Ores treated by the company are mined on the company's properties located at Great Bear Lake, N.W.T.

Manitoba.—The Hudson Bay Mining and Smelting Co. Ltd., smelted in the reverberatory furnace at Flin Flon during 1932—241,432 tons of Flin Flon ore and concentrates assaying: Au. oz., ·352; Ag. oz., 4·06; cu., 9·65 per cent, from which there was produced and shipped blister copper with an average assay of: Au. oz. 3·212; Ag. oz., 38·69; cu., 98·90 per cent, and containing a total of 82,565 ounces gold, 943,417 ounces silver and 42,371,629 pounds of copper. In addition 23,711 tons of custom ore and concentrates were smelted, making a total of 265,143 tons of total new charge smelted by the reverberatory or 727 tons per day. The electrolytic zinc plant of the company operated continuously and efficiently during the year, treating 65,147 tons of zinc concentrates averaging gold ·12 oz.; silver, 2·10 oz.; copper, 1·54 per cent; zinc, 43·9 per cent, from which were produced 41,736,600 pounds of zinc. In addition there was produced as a necessary part of the operation of the zinc plant, a zinc plant residue and a so-called cadmium precipitate. The cyanide annex continued to operate successfully during the year. This unit was designed to treat only 1,600 tons of tailings per day. Output was increased to nearly double this during 1932; 695,494 tons of sulphide ore tailings were treated, averaging gold ·0410 ounces and silver, ·545 ounces. From the treatment of these tailings there were recovered the following metals in the form of a so-called zinc dust precipitate, gold, 11,526·44 ounces; silver, 97,541·45 ounces; and copper, 55,249 pounds. The production from this source is included in the blister copper production given under the copper smelter.

British Columbia.—The Consolidated Mining and Smelting Company produced in its Trail plants during 1931 and 1932 the following metals:—

	1931	1932
	Pounds	Pounds
Lead.....	277,685,229	253,237,783
Zinc.....	202,247,767	130,567,785
Copper.....	1,215,433	767,026
Silver.....	6,572,119	5,522,366
Bismuth.....	93,115	57
Cadmium.....	323,139	65,425

SALES

	1930	1931	1932
	Pounds	Pounds	Pounds
Lead.....	251,400,000	260,200,000	252,700,000
Zinc.....	170,600,000	207,800,000	157,000,000

The quantity of metal stocked by the company remained approximately the same throughout 1932 but the value at which this metal was carried at the end of the year was down by over half a million dollars. The price received for the metal sold in 1932 was about \$1,500,000 less than the average 1931 sales would have yielded on the same metal. No attempt was made by the company to reduce costs by highgrading the ore bodies, by letting the plants run down, or in any way discounting the future. Total production of the Sullivan mine for the year amounted to 1,447,448 tons, comprising 6,403 tons of crude lead ore shipped to Tadanac and 1,441,045 tons of lead zinc ore to the concentrator at Kimberley, being 173,695 tons less than in 1931. New low costs were established in the lead smelting plant both for smelting a ton of ore and per ton of lead produced in spite of reduced tonnage. Recoveries were practically the same as the high record of 1931. The fuming plant costs showed a very satisfactory reduction. There was a big reduction in the cost of producing zinc from the zinc fume made by the slag fuming plant and a slight reduction in the cost of making zinc from zinc concentrates. This plant was only working at about half capacity. Operations in the cadmium plant were curtailed to suit the market, extra cadmium residues being stored for future demands. The sulphuric acid plants worked very successfully during the year. Most of the sulphur dioxide gases from the zinc plant roasters were converted into sulphuric acid.

The Granby Consolidated Mining, Smelting and Power Company, Ltd., operating mines and a smelter at Anyox in the Nass river mining division, conducted continuous operations in 1932 and consideration was given to the employment of a maximum number of men. Milling of about 5,000 tons of ore a day was maintained. The United States copper tariff together with low copper prices necessitated curtailment of the usual shipments, however, metallurgical improvements made possible the shipment of approximately 300 tons of high grade gold-copper blister per month. Technical skill and efficiency have resulted in remarkably low costs of operation for which great credit is due the entire staff and personnel.

Table 155.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment.....	129,485,934	107,238,667
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	20,927,287	10,370,049
(c) Inventory value of finished products on hand.....	8,492,748	17,925,108
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	16,763,226	14,175,036
Total.....	175,669,195	149,708,860

Table 156.—Employees, Salaries and Wages in the Non-Ferrous Smelting and Refining Industry in Canada, 1931 and 1932

	1931	1932
Salaried employees.....	No. 878	739
Salaries.....	\$ 2,131,079	1,690,710
Wage earners*.....	No. 6,982	4,604
Wages.....	\$ 11,114,248	7,088,260
Total employees.....	No. 7,860	5,343
Total salaries and wages.....	\$ 13,245,327	8,778,970

*See note on page 36.

Table 157.—Ores, Concentrates and Residues Smelted and Value of Smelter and Refinery Products in the Non-Ferrous Smelting and Refining Industry, 1931 and 1932

	1931	1932
	\$	\$
Materials used—		
Ores, concentrates, residues, etc. (estimated value).....	48,336,301	37,719,947
Cost of fuel and electricity.....	6,053,398	4,435,394
Products—		
Gold, silver, platinum metals, blister copper, refined copper, lead, zinc, nickel, nickel-copper matte, nickel oxide, nickel salts, cobalt, cobalt oxide, aluminium, base bullion, cadmium, bismuth and selenium.....	98,565,755	76,442,076

CHAPTER SEVEN

**THE COAL MINING, COKE, NATURAL GAS, PEAT AND PETROLEUM INDUSTRIES
(Fuels) IN CANADA**

The Coal Mining Industry in Canada

1. General Review
2. Commodity Statistics on Coal—including Tables on Output, Disposition, Shipments, Imports into Canada and Exports, Consumption and World Output

The Coke and Gas Industry in Canada

The Peat Industry in Canada

The Petroleum Industry in Canada

1. Production of Crude Petroleum
2. Production of Petroleum Products

NOTE.—In order to correlate data, regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information in detail regarding these industries as a whole, dealing principally with the mineral industry although supplementary data are shown for closely allied manufacturing operations.

THE COAL MINING INDUSTRY

Coal production in Canada during 1932 totalled 11,738,913 tons valued at \$37,117,695, a 4.1 per cent decline in quantity and 9.9 per cent in value from the 1931 output of 12,243,211 tons worth \$41,207,682. The production of bituminous coal in 1932 amounted to 7,714,279 tons or 12.9 per cent below the output in the preceding year; sub-bituminous coal output increased 19.0 per cent to 560,902 tons and lignite coal production was 19.0 per cent higher at 3,463,732 tons. Nova Scotia mines produced 4,084,581 tons, a decline of 17.6 per cent during the year. New Brunswick's output advanced 16.7 per cent to 212,695 tons. Manitoba's production increased slightly to 1,552 tons. An increase of 33.8 per cent was recorded in Saskatchewan's output; the 1932 total was 887,139 tons. Alberta mined 4,870,648 tons or 6.7 per cent above the preceding year's output. Continuing the yearly decline shown since 1928, British Columbia's production in 1932 of 1,681,490 tons was 10.4 per cent below the preceding year's total. The Yukon output declined 10.6 per cent to 808 tons in 1932.

Canadian coal exports declined 20.7 per cent to 285,487 tons in 1932 from the 1931 total of 359,853 tons. Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario ports cleared 159,487 tons of Canadian coal and the western ports, 126,000 tons.

Imports into Canada during the year totalled 11,673,428 tons or 13.7 per cent below the tonnage brought into Canada in 1931. Anthracite coal importations were recorded at 3,138,157 tons made up of 1,685,532 tons from the United States, 1,399,086 tons from Great Britain, 52,189 tons from Germany, 700 tons from French Indo-China and 650 tons from Belgium. These figures show a decided change in Canada's source of anthracite supply as the imports from Great Britain in 1932 increased 59.6 per cent and receipts from the United States, on the other hand, declined 24.6 per cent. Bituminous coal importations showed a 17.5 per cent falling off in 1932 and amounted to 8,532,318 tons as against 10,347,280 tons in 1931. Lignite coal to a total of 2,953 tons was obtained from the United States in 1932.

On the average, 25,597 wage-earners were engaged in the operation of Canada's coal mines; in the preceding year the average was 26,489. Nova Scotia and New Brunswick mines employed 13,332 men and the western mines, 12,265 men. Men working on the surface averaged 219 days employment during the year while underground men obtained only 166 days work. In addition to these wage-earners there were 1,363 salaried employees on the mine payrolls in 1932. All employees working in or about the coal mines during the year received \$25,042,769 as compared with \$28,802,428 in 1931.

The output decline in 1932 was reflected, naturally, in the number of man days work furnished employees; the total for the year was 4,544,262; in the preceding year, 4,891,541 man days work was done.

In 1932, domestic and industrial consumers in Canada used approximately 23·1 million tons of coal, in addition to considerable quantities of coke, natural and artificial gas, fuel oil, wood and electricity. Coke made available for consumption during the year totalled 2,274,034 tons as against 2,545,069 tons imported in 1931. Sales of coke in Canada were recorded at 1,002,816 tons or 61·2 per cent of the total output for the year. Coke imports decreased 11·1 per cent to 651,802 tons from the 1931 total of 733,274 tons. The coal equivalent of coke imported during the year was 1,002,771 tons. Canadian coal used in the manufacture of coke totalled 449,264 tons, in addition to which 1,767,748 tons of imported coal were carbonized.

Table 158.—Capital Employed in the Coal Mines of Canada, by Provinces, as at December 15, 1931 and 1932

Province	1931				1932			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	47,499,461	2,495,702	5,772,916	55,768,079	49,245,089	1,944,931	5,604,082	56,794,102
New Brunswick...	1,635,844	19,934	246,197	1,901,975	1,449,380	18,885	178,190	1,646,455
Manitoba.....					589		400	989
Saskatchewan.....	4,318,100	115,508	208,142	4,641,750	4,583,920	88,922	257,489	4,930,331
Alberta.....	41,137,728	1,360,120	6,421,881	48,919,729	36,803,903	1,324,810	5,826,217	43,954,930
British Columbia.	21,549,427	663,836	2,065,070	24,278,333	21,225,502	649,393	2,474,969	24,349,864
Yukon.....	203,000			203,000	203,000			203,000
Canada.....	116,343,560	4,655,100	14,714,206	135,712,866	113,511,383	4,026,941	14,341,347	131,879,671

Table 159.—Employees, Salaries and Wages in the Coal Mines of Canada, by Provinces, 1932

Province	Average number of employees					Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Surface	Under-ground				
Nova Scotia.....	405	45	2,079	10,544	13,073	797,164	9,978,207	10,775,371
New Brunswick.....	20	7	140	569	736	53,094	507,664	569,758
Manitoba.....			2	4	6		3,204	3,204
Saskatchewan.....	47	5	224	524	800	109,833	524,212	634,045
Alberta.....	565	35	2,071	5,753	8,424	1,292,084	7,475,667	8,767,751
British Columbia.....	217	17	1,036	2,648	3,913	527,153	3,772,062	4,299,215
Yukon.....			1	2	3		2,425	2,425
Canada.....	1,254	109	5,553	20,044	26,960	2,779,328	22,263,441	25,042,769

Table 160.—Wage-earners Employed in the Coal Mines of Canada, by Classes and by Provinces, 1932, with Comparative Totals for 1931

Classification	Province							Canada		
	Nova Scotia	New Brunswick	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Surface	Underground	Total
Administration.....	65	14		11	81	20		150	11	191
Officials, foremen and clerks.....	701	23	2	74	584	230	1	523	1,092	1,615
Screenmen and loaders.....	686	34		71	730	127	1	1,649		1,649
Stripping shovel operators.....				5				5		5
Hand cutters and helpers.....	1,024	437	3	296	1,743	1,150	1		4,654	4,654
Machine cutters and helpers.....	1,158	36		25	392	93			1,704	1,704
Machine loaders and helpers.....	2,062	15		42	1,668	143			3,930	3,930
Horse haulage employees.....	499	2	1	55	471	246		40	1,234	1,274
Mechanical haulage employees.....	1,562	5		23	328	263		93	2,088	2,181
Ventilation employees.....	257	2		1	64	29			352	353
Roadmakers.....	292	10		25	131	56		5	509	514
Timbermen.....	1,040	23		9	217	148		14	1,423	1,437
Pumpmen.....	112	4		6	43	27		7	185	192
Loading shovel.....				7				7		7
Chute loaders.....	41				132	6			179	179
Enginemmen.....	238	15		11	153	64		498	73	481
Firemen.....	134			10	100	41		285		285
Machinists.....	193	1		3	62	51		301	9	310
Carpenters and masons.....	113	4		7	42	50		216		216
Other mechanics.....	290	4		9	78	112		272	221	493
Japanese.....						55		1	54	55
Chinese.....						193		123	70	193
Indians.....						1			1	1
All other employees.....	2,156	80		58	805	579		1,423	2,255	3,678
Total for 1932.....	12,623	709	6	748	7,824	3,684	3	5,553	20,044	25,597
Total for 1931.....	13,388	608	38	538	8,024	3,890	3	5,788	20,701	26,489

Table 161.—Output of Coal from Canadian Mines, 1923-1932

Year	Short tons	Value	Average per ton
1923.....	16,990,571	\$ 72,058,986	\$ 4.24
1924.....	13,638,197	53,593,988	3.93
1925.....	13,134,968	49,261,951	3.75
1926.....	16,478,131	59,875,094	3.63
1927.....	17,426,861	61,867,463	3.55
1928.....	17,564,293	63,757,833	3.66
1929.....	17,496,557	63,065,170	3.60
1930.....	14,881,324	52,849,748	3.55
1931.....	12,243,211	41,207,682	3.37
1932.....	11,738,913	37,117,695	3.16

Table 162.—Output and Value of Coal in Canada, by Kinds and by Provinces, 1931 and 1932

(Short tons)

Province	1931			1932		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
NOVA SCOTIA (Bituminous).....	38	4,955,563	\$ 19,016,720	38	4,084,581	\$ 15,167,793
NEW BRUNSWICK (Bituminous).....	18	182,181	743,196	20	212,695	794,168
MANITOBA (Lignite).....	3	1,306	3,797	3	1,552	3,684
SASKATCHEWAN (Lignite).....	*58	662,836	945,259	*92	887,139	1,229,449
ALBERTA—						
Bituminous.....	17	1,846,306	6,249,779	17	1,734,705	5,715,491
Sub-bituminous.....	23	471,343	1,211,197	22	560,902	1,329,316
Lignite.....	†268	2,246,366	5,881,699	†272	2,575,041	6,481,502
Total.....	308	4,564,015	13,342,675	311	4,870,648	13,526,309
BRITISH COLUMBIA (Bituminous).....	26	1,876,406	7,150,996	28	1,681,490	6,392,801
YUKON (Bituminous).....	1	904	5,039	1	808	3,491
CANADA—						
Bituminous.....	100	8,861,360	33,165,730	104	7,714,279	28,073,744
Sub-bituminous.....	23	471,343	1,211,197	22	560,902	1,329,316
Lignite.....	329	2,910,508	6,830,755	367	3,463,732	7,714,635
Total.....	452	12,243,211	41,207,682	493	11,738,913	37,117,695

* Exclusive of 15 small mines in operation during part of 1931 and 62 small mines operating during part of 1932.

† Exclusive of 18 small mines operated under special permits in 1931 and 61 small mines in 1932.

Table 163.—Disposition of Coal from Canadian Mines, 1931 and 1932

	1931			1932		
	Total coal	Total value	Average value per ton	Total coal	Total value	Average value per ton
	Tons	\$	\$	Tons	\$	\$
Supplied to employees for domestic consumption.....	168,265	601,146	3.57	159,050	478,559	3.01
Used for power purposes—						
(a) Shops.....	84,702	282,867	3.34	73,466	260,050	3.54
(b) Colliery boilers.....	614,860	1,667,103	2.71	562,852	1,479,650	2.63
(c) Companies' railroads.....	63,448	235,270	3.71	57,547	208,431	3.62
(d) Harbour tugs and dredges.....	201	850	4.23			
Shipped. (See Table 165)—						
(a) Ships' bunkers.....	222,526			164,098		
(b) Railroads.....	3,146,967	37,762,927	3.44	2,865,239	34,506,363	3.27
(c) Other.....	7,603,342			7,537,793		
Used in making coke at colliery.....	110,219	391,283	3.55	52,231	180,627	3.46
Used in making briquettes.....	28,102	70,437	2.51	25,912	57,649	2.22
Put on bank.....	726,068	2,647,031	3.65	626,129	2,187,238	3.49
Put on waste heap.....	200,463			262,703		
Total disposition.....	12,969,163	43,658,914	3.37	12,387,020	39,358,567	3.18
Lifted from bank.....	725,952	2,451,232	3.38	642,331	2,240,872	3.49
Lifted from waste heap.....				5,776		
Total output.....	12,243,211	41,207,682	3.37	11,738,913	37,117,695	3.16

Table 164.—Disposition of Coal from Canadian Mines, by Provinces, 1932

(Short tons)

	Nova Scotia	New Brunswick	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Canada
Supplied to employees for domestic consumption.....	95,729	2,531	70	3,820	37,249	19,643	8	159,050
Coal shipped. (See Table 165).....	3,619,206	205,853	1,384	824,166	4,495,608	1,420,572	341	10,567,130
Used under colliery boilers, etc.....	238,123	2,298		25,302	179,705	117,405	19	562,852
Used by companies' railroads.....	33,391	825		5,361	7,168	10,802		57,547
Used for manufacture of coke at colliery.....					4,591	47,640		52,231
Used in making briquettes.....				13,283	12,629			25,912
Used in shops, etc.....	73,466							73,466
Used by harbour tugs and dredges.....								
Put on bank.....	515,506	11,223		11,860	42,291	45,249		626,129
Put on waste heap.....	49,434	71	98	8,075	132,869	71,716	440	262,703
Total disposition.....	4,624,855	222,801	1,552	891,867	4,912,116	1,733,027	808	12,387,020
Lifted from bank.....	537,051	10,106		4,728	40,740	49,706		642,331
Lifted from waste heap.....	3,223				722	1,831		5,776
Total output.....	4,984,581	212,635	1,552	887,139	4,870,645	1,681,499	808	11,738,913

Table 165.—Shipments of Coal from Canadian Mines, by Grades and Destinations, 1931 and 1932

(Short tons)

Destination	1931				1932			
	Run-of-mine	Screened	Slack	Total	Run-of-mine	Screened	Slack	Total
Prince Edward Island.....	3,339	69,859	3,285	76,483	6,222	58,597	4,323	69,142
Nova Scotia.....	241,637	444,489	441,524	1,127,650	132,417	356,600	299,031	788,048
New Brunswick.....	127,859	114,656	223,946	466,461	112,020	104,185	220,726	436,931
Quebec.....	67,558	805,092	873,633	1,746,283	68,816	736,326	782,416	1,567,558
Ontario.....	395	22,229	5,774	28,398	3,537	21,395	4,824	29,756
Manitoba.....	163,932	282,891	299,360	746,183	141,524	373,375	387,648	902,547
Saskatchewan.....	222,975	647,457	429,488	1,299,920	285,829	845,137	456,666	1,587,632
Alberta.....	202,137	377,294	443,193	1,022,624	200,692	425,664	480,318	1,106,674
British Columbia.....	28,780	574,299	234,588	837,667	18,665	592,352	177,835	788,852
Yukon.....		260		260		341		341
Total domestic shipments.....	1,058,612	3,338,526	2,954,791	7,351,929	969,722	3,513,972	2,813,787	7,297,481
Railroads.....	2,367,457	591,709	187,801	3,146,967	2,196,059	555,369	113,811	2,865,239
Ships' bunkers.....	166,590	55,432	504	222,526	112,438	51,317	343	164,098
Total railroads and ships bunkers.....	2,534,047	647,141	188,305	3,369,493	2,308,497	606,686	114,154	3,023,337
United States.....	1,418	40,484	82,528	124,430	2,164	32,289	78,518	112,971
Alaska.....		18,022		18,022		14,779		14,779
Newfoundland.....	1,889	106,700		108,589	2,889	107,071	1,220	111,180
Other Countries.....		372		372	899	483		1,382
Total external shipments.....	3,307	165,578	82,528	251,413	5,952	154,622	79,738	249,312
Total.....	3,595,966	4,151,245	3,225,624	10,912,835	3,234,171	4,275,250	3,007,679	10,567,130

Table 166.—Imports of Anthracite and Bituminous Coal into Canada from Great Britain, by Grades and by Provinces, 1931 and 1932

(Short tons)

Destination	1931			1932			
	Anthracite		Bituminous, all grades	Anthracite			Bituminous, all grades
	Grate, egg, stove, nut, and pea	Buckwheat, rice, and barley		Grate, egg, stove, nut, and pea	Screenings, or dust	N.O.P.	
Prince Edward Island.....	7,413	.....	1,833	2,501	.....	1,364	2,067
Nova Scotia.....	34,844	.....	38,352	43,294	.....	.....	49,274
New Brunswick.....	45,598	.....	6,162	78,287	60	286	15,792
Quebec.....	781,605	4,696	75,560	1,177,328	5,041	59,335	290,780
Central Ontario.....	2,208	.....	391	26,919	.....	.....	3,001
Head of Lakes.....	.....	.....	.....	4,669	.....	.....	.....
British Columbia.....	.....	.....	.....	.....	.....	2	1,154
Canada.....	871,668	4,696	122,298	1,332,998	5,101	69,987	352,068

Table 167.—Imports of Anthracite, Bituminous and Lignite Coal into Canada from the United States, by Grades and by Provinces, 1931 and 1932

(Short tons)

Destination	1931				1932				
	Anthracite		Bituminous, all grades	Lignite	Anthracite		N.O.P.	Bituminous, all grades	Lignite
	Grate, egg, stove, nut, and pea	Buck- wheat, rice, and barley			Grate, egg, stove, nut, and pea	Screen- ings or dust			
Prince Edward Island.....	1,271	.....	3,246	.....	29	.....	2,005	3,973	.....
Nova Scotia.....	15,209	95	5,685	.....	10,177	.....	.....	59	.....
New Brunswick.....	38,644	776	31,068	.....	29,309	.....	357	11,349	.....
Quebec.....	434,863	110,100	858,015	.....	348,654	6,711	52,640	470,781	.....
Ontario.....	1,483,553	148,184	9,315,172	.....	1,121,633	3,530	106,684	7,667,071	.....
Manitoba.....	2,415	1,280	7,041	.....	3,800	.....	.....	12,298	156
Saskatchewan.....	.....	.....	1,535	23	.....	.....	.....	1,459	17
Alberta.....	.....	.....	912	.....	.....	.....	3	830	.....
British Columbia.....	.....	33	2,298	6,387	.....	.....	.....	2,424	2,780
Yukon.....	.....	.....	10	.....	.....	.....	.....	4	.....
Canada.....	1,975,955	260,468	10,224,982	6,410	1,513,602	10,241	161,689	8,170,248	2,953

Table 168.—Imports of Anthracite and Bituminous Coal into Canada from Other Countries, by Provinces, 1931 and 1932

(Short tons)

Destination	Source	1931			1932			
		Anthracite		Bitu- minous, all grades	Anthracite			Bitu- minous, all grades
		Grate, egg, stove, nut, and pea	Buck- wheat, rice, and barely		Grate, egg, stove, nut, and pea	Screen- ings or dust	N.O.P.	
Nova Scotia.....	French East Indies.....	4,592	.....	.....	.....	.....	.....	.....
Quebec.....	Belgium.....	60,762	.....	.....	650	.....	.....	.....
British Columbia.....	Germany.....	.....	.....	.....	52,189	.....	.....	2
.....	Newfoundland.....	.....	.....	.....	.....	.....	.....	.....
.....	French East Indies.....	.....	.....	.....	.....	.....	700	.....
Canada.....	.....	65,354	.....	.....	52,839	.....	700	2

Table 169.—Average Imports of Coal into Canada, by Kinds and by Provinces for the Five Years, 1928-1932

(Short tons)

Destination	Anthracite			Total bituminous	Lignite	Total all grades
	Grate, egg, stove, nut and pea	Other	Total			
Prince Edward Island.....	5,320	1,692	7,012	6,052		13,064
Nova Scotia.....	61,217	19	61,236	39,789		101,025
New Brunswick.....	96,806	1,505	98,311	52,676		150,987
Quebec.....	1,426,408	152,943	1,579,351	1,141,654		2,721,005
Central Ontario.....	1,733,698	140,805	1,874,503	9,600,603		11,475,106
Head of Lakes.....	35,310	1,977	37,287	1,264,974		1,362,261
Total Ontario.....	1,769,008	142,782	1,911,790	10,865,577		12,777,367
Manitoba.....	5,200	1,825	7,025	36,008	411	43,444
Manitoba and Head of Lakes.....	40,510	3,802	44,312	1,300,982	411	1,345,705
Saskatchewan.....	262		262	1,965	175	2,402
Alberta.....		1	1	1,150		1,157
British Columbia.....	788	151	939	10,371	10,000	21,810
Yukon.....				25		25
Canada.....	3,365,009	300,918	3,665,927	12,155,273	10,586	15,831,786

Table 170.—Exports of Canadian Coal by Destinations, 1930-1932

(Compiled in the *External Trade Branch*)

Destination	1930		1931		1932	
	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$
BRITISH EMPIRE						
United Kingdom.....	18,453	132,602	10,488	70,508	8,575	53,811
Irish Free State.....	1,745	10,531	186	1,163	1,426	8,354
British South Africa.....	6,466	38,796	2,951	17,706	1,607	9,642
Bermuda.....					44	352
British Guiana.....			1,056	7,920		
British Honduras.....	125	788				
British West Indies—						
Jamaica.....	396	3,286				
Other B.W.I.....	5,123	30,737	992	5,949	439	2,634
Gibraltar.....			1,246	6,230		
Malta.....	286,630	1,472,401	112,663	616,101	87,539	466,936
Newfoundland.....	3,226	18,956	1,211	7,266	3,525	20,250
Sierra Leone.....	26,305	209,504	12,637	104,884	13,472	98,506
Australia.....	2,837	17,017	3,477	19,533		
New Zealand.....						
Total British Empire.....	351,306	1,934,568	146,907	857,260	116,627	660,485
FOREIGN COUNTRIES						
Argentina.....	5,193	31,158	7,871	47,229	71	515
Belgium.....	4,816	32,621	477	2,862	1,570	8,504
Brazil.....	1,530	9,180	3,947	27,095		
China.....	565	4,690	423	3,511	6,815	50,744
Cuba.....	352	2,112	400	2,400	1,502	9,052
Denmark.....					30	225
France.....	2,832	17,815	3,246	18,287	999	5,253
French Possessions—						
French Africa.....	1,209	7,254			447	2,682
St. Pierre and Miquelon.....	2,652	16,021	4,560	27,097	3,090	19,069
Syria.....	1,640	11,659	536	3,213		
Germany.....	4,157	25,885	2,472	14,432	726	4,964
Greece.....	4,799	29,031	1,589	9,592	307	1,689
Italy.....	3,455	19,250	1,862	11,741	3,523	26,593
Netherlands.....	1,945	11,829	1,592	8,702	2,098	11,011
Norway.....	2,449	9,799	1,729	7,347		
Peru.....	801	5,807	3,309	22,233	976	6,743
Poland and Danzig.....						
San Domingo.....	38	190				
Spain.....	705	5,816			161	960
Sweden.....	470	2,820				
Turkey.....						
United States.....	210,326	1,003,080	163,351	743,533	135,698	556,127
Alaska.....	23,272	165,413	15,582	103,388	10,847	68,420
Total foreign countries.....	273,206	1,411,430	212,946	1,052,662	168,860	772,551
Total.....	624,512	3,345,998	359,853	1,909,922	285,487	1,433,036

Table 171.—Annual Consumption of Coal in Canada, 1923-1932

Calendar year	Canadian*		Imported coal "entered for consumption"				Total	Per capita
			From U.S.A.	From Great Britain	Total†			
	Short tons	%	Short tons	Short tons	Short tons	%	Short tons	
1923.....	15,070,962	41.8	20,417,239	572,570	20,967,971	58.2	36,038,933	4.000
1924.....	12,529,358	42.8	16,405,344	317,112	16,714,143	57.2	29,243,501	3.199
1925.....	12,125,290	42.6	15,744,957	604,117	16,331,971	57.4	28,457,261	3.062
1926.....	15,086,296	47.7	16,204,405	287,299	16,565,555	52.3	31,651,851	3.349
1927.....	15,944,983	46.7	17,266,434	907,220	18,177,303	53.3	34,122,286	3.541
1928.....	16,487,807	50.0	15,830,688	682,755	16,515,582	50.0	33,003,889	3.356
1929.....	16,387,461	48.0	16,780,452	843,502	17,724,132	52.0	34,111,593	3.402
1930.....	14,052,671	43.3	16,971,933	1,144,861	18,412,039	56.7	32,464,710	3.181
1931.....	11,682,779	47.7	11,793,798	987,442	12,328,327	52.3	24,511,106	2.362
1932.....	11,212,701	49.0	9,889,866	1,727,716	11,654,492	51.0	22,867,193	2.177

*The sum of Canadian coal mine sales, colliery consumption, coal supplied to employees, and coal used in making coke, etc., less the tonnage of coal exported.

†Includes small tonnages from countries other than Great Britain and the United States. Deductions have been made to take account of foreign coal re-exported from Canada and bituminous coal ex-warehoused for ships' stores.

Table 172.—Summary Statistics for 1932—Output, Exports, Interprovincial Shipments, Imports and Coal made Available for Consumption in Canada, by Provinces

(Short tons)

Province	Canadian coal				Im-ported from U.S.A.	Im-ported from Great Britain	Im-ported from Ger-many	Im-ported from F'nch East Indies	Im-ported from Bel-gium	Im-ported from New-found-land	Coal available for con-sumption
	Output	Received from other provinces	Shipped to other provinces	Ex-ported							
PRINCE EDWARD ISLAND—											
Anthracite.....					2,034	3,865					5,899
Bituminous.....		69,142		70	3,973	2,067					75,112
Total.....		69,142		70	6,007	5,932					81,011
NOVA SCOTIA—											
Anthracite.....					10,177	43,294			650		54,121
Bituminous.....	4,084,581		2,024,831	108,028	59	49,274					2,001,055
Total.....	4,084,581		2,024,831	108,028	10,236	92,568			650		2,055,176
NEW BRUNSWICK—											
Anthracite.....					29,666	78,633					108,299
Bituminous.....	212,695	367,728	2,067	51,315	11,349	15,792					554,182
Total.....	212,695	367,728	2,067	51,315	41,015	94,425					662,481
QUEBEC—											
Anthracite.....					408,005	1,241,704	52,189				1,701,898
Bituminous.....		1,587,423		66	470,781	290,780				2	2,348,920
Sub-bituminous.....		135									135
Lignite.....											
Total.....		1,587,558		66	878,786	1,532,484	52,189			2	4,050,953
CENTRAL ONTARIO—											
Anthracite.....					1,223,839	26,919					1,250,758
Bituminous.....		3,031		8	6,913,221	3,001					6,919,245
Sub-bituminous.....		5,709									5,709
Lignite.....		21,016									21,016
Total.....		29,756		8	8,137,060	29,920					8,196,728
MANITOBA AND HEAD OF LAKES—											
Anthracite.....					11,808	4,669					16,477
Bituminous.....		201,154		195	766,148						967,107
Sub-bituminous.....		63,387									63,387
Lignite.....	1,552	636,622		1,125	156						637,205
Total.....	1,552	901,163		1,320	778,112	4,669					1,684,176

Tripoli is a form of silica which closely resembles diatomite but is of entirely different origin. It is generally regarded as a chalcedonic variety of silica. It is soft, friable, porous, and double refracting. The once and double-ground types are made into general compositions for polishing brass, copper, nickel, bronze, etc., while the air-float variety lends itself particularly for liquid polishes. There is also a large trade in the manufacture of foundry parting and in concrete mixing.

Production of true diatomite in Canada during 1932 totalled 1,496 tons valued at \$29,509 as compared with 1,610 tons worth \$32,789 in 1931 and 554 tons at \$13,247 in 1930.

Diatomite prices for September, 1933, United States, were: per ton, f.o.b. Nevada crude, dried, in bags, \$7.50; 40 mesh, \$20; 300 mesh, \$22.50; high temperature insulation, \$30.

Garnets.—A deposit of garnets in Ashby township, Ontario, was operated during 1923 and 1,250 tons of garnet concentrates and crude garnets were shipped to Niagara Falls, New York, for use as an abrasive material. In 1924, a shipment of 360 tons of garnets was made but there has been no production from this deposit since that year.

There was no commercial production of garnets in Canada during 1932. The Labelle Nickel and Garnet Co. Ltd., however, conducted development work on a garnet deposit in Labelle county, Quebec. This consisted of surface stripping and shaft sinking; some machinery was installed and 100 tons of rock mined. This was shipped to the United States for experimental purposes. The greater proportion of garnet sold is used for abrasive-coated papers and cloths; considerable quantities are also employed in the plate glass surfacing industry. Several varieties of the mineral of which almandite, an iron aluminium silicate, is generally considered as being the best quality abrasive.

Garnet prices in the United States in September, 1933, were: per ton, f.o.b. New Hampshire mines; concentrate, \$40; washed grades, \$125. New York, Adirondack garnet concentrates, \$85. Spanish grades, \$60, c.i.f. port of entry.

Grinding Pebbles.—No shipments from Canadian deposits of pebbles suitable for use as grinding material have been reported since 1926; during that year 64 tons were produced from deposits occurring on the north shore of Lake Superior near Jackfish, Ontario. Pebbles are now cut in the United States from solid blocks of quartzite and later rounded smooth in tube mills; this product is claimed to last longer and is superior to the imported Danish pebbles.

The Mines Branch, Ottawa, reports that a considerable deposit of pebbles suitable for grinding purposes occurs on the north shore of Gabarus Bay, Cape Breton county, Nova Scotia.

Grindstones, Pulpstones and Scythestones.—The production of grindstones, pulpstones and scythestones from Canadian quarries during 1932 amounted to 328 tons valued at \$15,735 as compared with 621 tons worth \$38,103 in 1931 and 830 tons at \$62,021 in 1930. In Nova Scotia the Read Stone Co. Ltd. carried out work at Quarry Island in Merigomish Harbour. Blocks up to six feet in diameter and weighing one ton were shipped to their property at Stonehaven, New Brunswick. This company produced grindstones and scythestones at the Stonehaven plant from rock obtained at Quarry Island, Woodpoint, Miramichi, Clifton, etc. At Shediac, New Brunswick, crude block scythestones were produced by E. A. Smith. These were exported to the United States. In British Columbia the J. A. McDonald Company of Vancouver produced pulpstones; the quarry of this company, located on Newcastle Island, was closed down early in 1932. "Mineral Industry" remarks that the demand in the United States for grindstones is mainly confined to the large 6 and 7 foot diameter stones used for file, saw, granite-tool and machine-knife grinding. Inroads have been made in the last named trade by artificial wheels. There has been some increase in the use of the artificial pulpstone made up of bonded silicon-carbide segments. These stones now have cement instead of iron centres. Recently, another large manufacturer of artificial abrasives has put a somewhat similar stone on the market with the segments made up of bonded fused alumina instead of silicon-carbide abrasive grain.

Consumption of pulpstones by the Canadian pulp and paper industry for 1930 and 1931 was as follows:—

	1930		1931	
	Number	Value	Number	Value
For 2 foot wood.....	310	\$ 98,484	226	\$ 72,588
For 2-5 foot wood.....	218	78,288	225	71,760
For 4 foot wood.....	359	400,187	285	337,580

Volcanic Dust (Pumicite).—The total production of volcanic ash in Canada during 1932 amounted to 180 tons valued at \$3,600 as compared with an output of 128 tons valued at \$2,560 in 1931. Canadian production of this material comes entirely from deposits located near Swift Current, Saskatchewan. The deposit consists of loosely compacted finely divided material, the greater part of which is light buff in colour. Volcanic dust is used for similar purposes as ground pumice, for scouring, cleansing and insulating, etc. In the United States there is a growing demand for both the gravel or pea-sized granules as well as for the sand for sound-deadening purposes, such as acoustic plasters; among the newer uses there appears to be a fair demand as an ingredient in concrete; pumice powder was spread and rolled on several hundred miles of oiled roads in Kansas and it is claimed that a good surface was obtained at low cost.

Table 191.—Capital Employed in the Natural Abrasives Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
Capital employed as represented by:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	513,751	605,436
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	2,472	1,280
(c) Inventory value of finished products on hand.....	16,559	15,394
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	36,990	57,755
Total.....	569,772	679,865

Table 192.—Employees, Salaries and Wages in the Natural Abrasives Industry in Canada, 1931 and 1932

	1931				1932			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	6	3	9	\$ 11,856	7	2	9	\$ 11,671
Wage earners.....	22	.....	22	13,981	27	.....	27	14,800
Total.....	28	3	31	25,837	34	2	36	26,471

Table 193.—Production of Diatomite in Canada, 1923-1932

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	130	3,250	1929.....	429	10,330
1924.....	33	838	1930.....	554	13,247
1925-1926.....	.....	.....	1931.....	1,610	32,789
1927.....	266	6,650	1932.....	1,496	29,509
1928.....	368	8,960			

NOTE.—For years 1896 to 1922 see previous reports.

Table 194.—Production of Grindstones in Canada, by Provinces, 1923-1932

(For the years 1886 to 1921 see Mineral Production of Canada 1928)

Year	Nova Scotia		New Brunswick		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1922.....	102	3,692	735	26,600	837	30,292
1923.....	254	7,906	1,463	43,577	1,717	51,483
1924.....	338	12,525	1,693	56,586	2,031	69,111
1925.....	439	16,723	1,296	45,061	1,735	61,784
1926.....	311	15,136	1,202	43,850	1,513	58,986
1927.....	11	220	1,306	47,255	1,317	47,475
1928.....	.....	.....	1,250	45,901	1,250	45,901
1929.....	6	110	1,032	37,291	1,038	37,401
1930.....	6	110	229	9,764	235	9,874
1931.....	.....	.....	198	8,164	198	8,164
1932.....	12	433	188	8,903	200	9,336

Table 195.—Production of Pulpstones and Sharpening Stones in Canada, 1923-1932

Year	Pulpstones		Sharpening stones		Year	Pulpstones		Sharpening stones	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1923.....	260	25,100	35	3,500	1928....	581	52,659	24	2,400
1924.....	624	58,113	36	3,600	1929....	754	62,336	155	6,617
1925.....	781	57,781	46	4,600	1930....	573	49,897	22	2,250
1926.....	1,155	89,541	27	2,700	1931....	342	27,305	81	2,634
1927.....	911	75,242	23	2,300	1932....	60	3,500	68	2,899

Table 196.—Production of Grindstones, Pulpstones and Scythestones in Canada, by Provinces, 1930-1932

Province	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Nova Scotia.....	6	100			12	433
New Brunswick.....	495	35,689	299	12,308	256	11,802
British Columbia.....	329	26,222	322	25,795	60	3,500
Total.....	830	62,021	621	38,103	328	15,735

Table 197.—Imports into Canada and Exports of Abrasives, 1930-1932

Item	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
IMPORTS—						
Abrasives—						
Artificial abrasives in bulk, crushed or ground, when imported for use in the manufacture of abrasive wheels and polishing composition.....		205,042		184,280		154,419
Diamond dust or bort, and black diamonds for borers.....		1,440,871		450,148		129,703
Diatomaceous earth or infusorial earth (Kieselguhr) ground or unground cwt.....	6,582	12,004	17,000	25,788	2,009	2,944
Emery in bulk, crushed or ground.....		37,353		26,280		31,252
Grinding wheels, manufactured by bonding together of either natural or artificial abrasives.....		150,503		125,673		132,373
Grinding stones or blocks manufactured by the bonding together of either natural or artificial abrasives.....		127,795		28,969		30,010
Grindstones, not mounted, and not less than 36 inches in diameter.....		229,436		111,770		83,896
Grindstones, n.o.p.....		12,134		7,228		3,587
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		36,089		34,542		22,391
Sand paper, glass, flint and emery paper or emery cloth.....		342,771		201,277		91,485
Iron sand or globules or iron shot and dry putty, for use in polishing glass or granite, or for sawing stone.....		41,758		25,319		8,142
Manufactures of emery or of artificial abrasives, n.o.p.....		57,791		44,429		38,778
Burrstones in blocks, rough or unmanufactured, not bound up or prepared for binding into mill-stones..... No.	21	1,007			10	927
Total.....		2,694,554		1,265,703		729,907
EXPORTS—						
Grindstones, manufactured.....		11,674		10,776		7,541
Abrasives—						
Natural, n.o.p., in ore or bulk, . . cwt.....	7,455	8,972	14,372	14,185	22,419	27,169
Artificial, crude, including carborundum..... cwt.....	1,128,775	2,842,289	851,206	1,981,713	246,177	953,422
Artificial, made up into wheels, stones, etc.....		36,489		19,576		24,221
Total.....		2,899,424		2,026,250		1,012,353

*From December, 1930.

2. ABRASIVES, ARTIFICIAL, AND ABRASIVE PRODUCTS

Production of artificial abrasives and abrasive products declined 69 per cent in 1932 when the output value was reported at \$1,489,555 compared with \$4,857,914 in 1931. The same 14 plants were in operation, 13 in Ontario and 1 in Quebec, but the number of employees dropped to 386 from 691 in 1931. Capital employed was only slightly lower at \$5,865,031 of which \$3,106,639 represented the value of lands, buildings, machinery and equipment. Materials for manufacturing cost \$449,624 in 1932 compared with \$1,709,983 in 1931.

The cost of fuel and electricity was given at \$480,601 in 1932 compared with \$640,815 in 1931. Considering the severe decline in production the 1932 figure for fuel and power seems excessively high but this is because the furnace operators purchase power on contract and had to pay on this basis although they did not require all of the power under the reduced scale of operations.

Artificial abrasives were made by 5 companies in 6 different plants; fused alumina was produced in 5 works and crude silicon carbide in 3 works. The output of fused alumina was 6,658 tons in 1932 compared with 35,781 in 1931 and the tonnage of silicon carbide was 3,164 tons against 10,754 tons in the preceding year. Grinding wheels were made in 7 works and the output was valued at \$293,528 compared with \$347,345 in 1931. Abrasive cloth and paper were manufactured in 2 plants, the same as in 1931.

ASBESTOS

The principal asbestos of commerce occurs in serpentine. That from Canada, and especially from Thetford Mines, is found to be more uniform in requisite commercial qualities and therefore more desirable and valuable than asbestos from most other countries.

The quantity and value of asbestos produced in Canada during 1932 showed decided declines from those for the output of this mineral in 1931.

Shipments fell to 122,977 tons valued at \$3,039,721 as compared with 164,296 tons worth \$4,812,886 in 1931, a decrease of 37 per cent in value and 25 per cent in volume. Compared with the figures for 1930 the decrease is still sharper, being 49 per cent in tonnage and 64 per cent in value. The average price of the asbestos shipped by the Quebec producers in 1932 was \$24.72 per ton whereas it was \$29.29 in 1931, \$34.65 in 1930 and \$43.04 in 1929. The tonnage of the shipments of asbestos in 1932 was the lowest recorded since 1921 and represents the lowest annual value since 1914. The average price for the year was the lowest in the history of the Quebec asbestos industry. The quantity of rock mined in 1932 totalled 1,145,340 short tons and the tonnage milled amounted to 1,029,709; 709,094 tons of tailings were re-treated.

The King mine of the Asbestos Corporation, Limited, was in operation steadily at Thetford Mines, Quebec, throughout the year. The method of underground working was changed during the year to what is known as the "block-caving" system. This is the method employed in the Miami, Morenci, and Inspiration mines of Arizona—all low-grade copper mines. The other mines of this Company—the Beaver-Consolidated at Thetford Mines, the Maple Leaf and Vimy Ridge in Coleraine township, the British Canadian at Black Lake, and the Asbestos Mines property at East Broughton—remained closed throughout the year.

Mining was carried on by the Canadian Johns-Manville Company, Limited, at the Jeffrey mine from January until May only. The mill, however, was operated throughout the year, being engaged from May onwards with re-treatment of tailings from previous years' operations.

The Bell mine and mill of the Keasbey and Mattison Company worked throughout the year on a reduced scale; the Johnson's mine at Thetford Mines was operated ten hours a day for nine months of the year while the Black Lake property of the same company remained closed. Nicolet asbestos mines were in operation only from Jan. 7th to Feb. 7th.

Operations by the Quebec Asbestos Corporation, Limited, were carried on at the Montreal mine for nine months of the year. Although, for the remaining three months, the mine was closed, stripping of the over-burden was carried on throughout the year, preparatory to extending the mining operations in a southwesterly direction.

The National Research Laboratories, Ottawa, have, as the results of experimental work, prepared specifications for a standard testing machine for use in grading of milled asbestos fibre.

These have now been unanimously approved by the industry. The National Research Laboratories are also, with the co-operation of the asbestos manufacturing firms, making a study of Canadian asbestos in comparison with asbestos from other countries, especially in regard to its suitability for certain manufacturing operations. Patents are reported to have been applied for for making new moulded asbestos compositions and investigations commenced as to an increase in the use of asbestos in asphalt pavements.

The Department of Mines for Southern Rhodesia states that the Rhodesian asbestos industry was severely handicapped in 1932 owing to other countries landing asbestos at European ports at very low prices. The following figures will illustrate the pronounced drop in Rhodesian asbestos production since 1930:—1930—37,766 tons; 1931—24,042 tons; and 1932—15,766 tons. The 1932 production of 15,766 tons produced in Victoria and Bulawayo was valued at £197,091, 15 shillings.

Crude asbestos exported from Southern Rhodesia during 1932 totalled 13,871 tons valued at £248,513.

The production of asbestos in the Union of South Africa in 1932 amounted to 12,070 short tons, valued at £130,704. This was a decline of 23 per cent in tonnage and of 48 per cent in value compared with the previous year. In the Transvaal, shipments of amosite decreased 33 per cent in tonnage and 40 per cent in value, and those of chrysotile asbestos decreased 22 per cent in tonnage and 53 per cent in value. Production of blue Cape asbestos declined 19 per cent in tonnage and 43 per cent in value.

It was reported that one of the largest rubber factories in the world was being constructed in 1932 at Yaroslavl, in the Ivanovo-Voznesensk industrial region, Russia. This factory will be part of a rubber-asbestos combine which is planned to have an annual output of 1,000 million rubles. It is said that the asbestos mill will produce 35 different parts for tractors and motor cars.

It is stated in "Asbestos" that the Tasmanian Asbestos Company of Beaconsfield, Tasmania, is reported to have commenced crushing and screening asbestos rock and is finding a ready market for the fibre in Melbourne and Sydney.

The "India Rubber Journal" states that the treatment of asbestos fibres with acid gases has become more popular. Bleaching by means of the gaseous process requires the laying down of acid distillation retorts, gas chambers for performing the actual bleaching operation and a condensation system for recovery of spent acid gas. . . . the process generally furnishes a very pure white product and it is an unusual experience to find any tint of colour remaining. During 1932 arrangements were made for the manufacture of resin-asbestos equipment in the United States. The resin material is available in several varieties to meet the specific requirements of the application; in some instances the filler is varied, either asbestos or graphite. The material has been used for handling sulphuric acid up to a strength of 50 per cent, concentrated hydrochloric, phosphoric, acetic, lactic, oxalic, citric, and tartaric acids; the material may be used up to 130 degrees C. and is easily machined and may be cut, drilled, planed or turned.

During 1932 a new asbestos cloth, in a complete line of plain colours and stripes, was introduced to the awning makers of the United States. Another new application of asbestos is in the construction of steel factory built houses and it is reported that some of the largest producing companies are devoting a part of their energies to this industry.

For an historical review of Canadian asbestos mining see the 1928 report on the Mineral Production of Canada.

Table 198.—Capital Employed in the Asbestos Industry in Canada, 1930-1932

	1930	1931	1932
	\$	\$	\$
Capital employed as represented by:			
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	32,304,389	33,657,879	23,620,216
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	1,884,669	1,009,423	789,742
(c) Inventory value of finished products on hand.....	.....	1,631,891	1,423,282
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	908,814	3,864,812	4,248,122
Total.....	35,097,872	40,164,005	30,081,362

Table 199.—Employees, Salaries and Wages in the Asbestos Industry in Canada, 1931 and 1932

—	1931				1932			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
Salaried employees.....	138	34	172	405,060	110	26	136	279,950
Wage-earners—								
Mine.....	869		869		540		540	
Mill.....	634		634		733		733	
Total.....	1,503		1,503	1,431,055	1,273		1,273	876,365
Grand total.....	1,641	34	1,675	1,836,115	1,383	26	1,409	1,156,315

Table 200.—*Production of Asbestos in Canada, 1923-1932

(For the years 1880 to 1922 see Mineral Production of Canada, 1928)

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1923.....	231,482	7,522,506	1928.....	273,033	11,238,360
1924.....	225,744	6,710,830	1929.....	306,055	13,172,581
1925.....	273,524	8,977,546	1930.....	242,114	8,390,163
1926.....	279,403	10,099,423	1931.....	164,296	4,812,886
1927.....	274,778	10,621,013	1932.....	122,977	3,039,721

*Sales.

Table 201.—Shipments of Canadian Asbestos, 1931 and 1932

Classification	1931			1932		
	Sold or shipped			Sold or shipped		
	Quantity	Total sales value at mill	Average value per ton	Quantity	Total sales value at mill	Average value per ton
	tons	\$	\$ cts.	tons	\$	\$ cts.
Crude No. 1.....	206	88,880	431.46	144	57,159	396.94
Crude No. 2.....	543	117,478	216.35	313	60,230	192.43
Other crudes.....				14	1,832	130.86
Spinning fibre.....	8,560	917,776	107.22	6,004	548,510	91.36
Shingle fibre.....	15,988	938,857	58.72	6,625	328,895	49.64
Paper fibre.....	39,867	1,381,888	34.66	32,694	1,008,436	30.84
Waste, stucco or plaster.....	6,309	159,043	25.20	3,984	92,800	23.29
Refuse or shorts.....	92,823	1,208,964	13.02	73,199	941,859	12.87
Total.....	164,296	4,812,886	29.29	122,977	3,039,721	24.72
Sand, gravel and stone (*).....	7,209	5,952	0.83	3,473	3,369	0.97

*The production is included under the sand and gravel industry.

Quantity of rock mined during 1931: 2,274,048 tons; 1932: 1,145,340 tons.

Quantity of rock milled during 1931: 2,164,060 tons; 1932: 1,029,709 tons.

Quantity of tailings re-treated during 1932: 709, 094 tons.

Table 202.—Imports of Asbestos into Canada, 1930-1932

Item	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Asbestos in any form other than crude, and all manufactures of, n.o.p.....		597,915		312,484		226,619
Asbestos packing.....	87	82,111	69	63,455	55	52,733
Asbestos brake and clutch lining.....		193,824		241,880		194,745
Total.....		873,850		617,819		474,097

Table 203.—Exports of Canadian Asbestos, by Countries of Destination, 1930-1932

Commodity and destination	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
ASBESTOS—		\$		\$		\$
United Kingdom.....	3,528	288,531	1,801	140,024	1,420	82,567
United States.....	66,857	3,723,462	46,002	2,171,000	27,392	1,274,646
Australia.....	481	47,979	304	20,010	451	24,800
Belgium.....	10,836	769,002	7,831	533,737	1,080	49,707
France.....	5,545	389,890	3,327	244,380	2,360	150,911
Germany.....	4,278	410,083	4,714	399,584	1,969	117,148
Italy.....	3,076	274,162	1,264	116,359	666	48,162
Japan.....	8,605	476,199	4,539	227,803	6,683	338,576
Netherlands.....	1,024	60,971	977	67,840	421	17,300
Spain.....	32	1,660	94	5,080	219	11,323
Other countries.....			50	3,500		
Total.....	104,262	6,441,939	70,903	3,929,317	42,661	2,115,140
SAND AND WASTE—						
United Kingdom.....	3,104	75,539	1,015	22,492	1,151	25,830
United States.....	121,605	1,791,306	83,082	1,130,159	65,618	901,927
Germany.....	2,310	51,115	1,568	34,717	733	13,934
Netherlands.....	1,367	31,590	870	21,380	764	18,385
Other countries.....	2,852	61,768	2,000	36,578	1,503	26,019
Total.....	131,238	2,011,318	88,535	1,245,326	69,769	986,095
ASBESTOS MANUFACTURES, INCLUDING ASBESTOS ROOFING—						
United Kingdom.....		139,460		66,078		35,325
United States.....		14,204		10,751		7,212
Newfoundland.....		15,203		13,684		3,985
New Zealand.....		735		764		813
Other countries.....		30,181		19,964		28,182
Total.....		199,783		111,241		75,517

Table 204.—World Production of Asbestos, 1930-1932

(Supplied by Imperial Institute)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
Southern Rhodesia.....	33,720	21,466	14,077	Finland (amphibole).....	1,061	572	(a)
Swaziland.....			4	France.....	495	500	(a)
Union of South Africa (b)...	23,083	11,480	7,844	Italy.....	710	571	(a)
Canada—				U.S.S.R. (Russia).....	53,228	63,653	(a)
Chrysotile.....	251,019	141,470	(c) 112,902	United States (Sales)—			
Crude.....	3,545	2,202	421	Amphibole.....	526	331	
Spinning fibre.....	12,886	10,115	5,361	Chrysotile.....	3,262	2,551	3,178
Shingle fibre.....	20,170	9,782	5,915	Japan (estimated).....	1,000	1,000	1,000
Paper fibre.....		33,260	29,191	Mozambique.....	16	(a)	(a)
Waste, stucco or plaster.....	178,053	5,650	3,557	Argentina.....			7
Refuse or shorts.....		74,024	65,356	China.....	310	260	(a)
Sand and gravel.....	36,365	6,437	3,111	Greece.....	2	10	(a)
Actinolite.....	30	31		Turkey.....		4	
Cyprus.....	7,256	1,138	1,520	Total.....	61,000	69,000	(a)
India.....	33	6	90	World's Total.....	376,000	245,000	(a)
Australia.....	82	122	130				
Total.....	315,000	176,000	136,000				

(a) Information not available.

(b) Production is not available by kinds, but sales were as follows:—

	1930	1931	1932
Amosite.....	2,930 long tons	1,863 long tons	1,242 long tons
Blue.....	4,894 "	3,259 "	2,647 "
Chrysotile.....	9,392 "	8,873 "	6,888 "

(c) Sales and shipments.

FELDSPAR AND QUARTZ

The first record of production in the feldspar industry in Canada dates back to about 1890, approximately 700 tons were mined in that year. This was followed by an increase until the maximum output of 44,804 tons was reached in 1924.

Most of the feldspar mined in Canada is of the potash variety known as orthoclase or microcline, albite a soda feldspar also occurs; there is, however, comparatively little demand for this mineral.

Owing to the very close physical association of these minerals in many Canadian deposits (pegmatites), it has been found very difficult for the operator to make a separate division of data pertaining to the mining of each individual mineral and for this reason the general statistics relating to capital, employment, fuel and electricity, etc., have been combined in this report.

Feldspar.—Feldspar production in Canada during 1932 amounted to 7,047 tons valued at \$81,982 as compared with an output of 18,343 tons worth \$186,961 in 1931 and 26,796 tons at \$268,469 in 1930. The total output in 1932 came from the provinces of Quebec and Ontario; the greater part of the feldspar mined in the former province comes from Derry township, Papi-neau county. The mineral was also shipped in 1932 from properties operating in the township of Aylevin and at Mont Laurier. The Canadian Flint and Spar Co. Ltd. operates a modern feldspar grinding plant at Buckingham, P.Q.; this was active throughout the year.

Production in Ontario came almost entirely from Bathurst township in the Perth area. Shipments of crude feldspar from this district went both to Canadian and United States markets. Two properties in the Hybla area in Hastings county also made shipments during the year.

The grinding plant operated at Kingston, Ontario, by the Frontenac Floor and Wall Tile Co. continued production of ground feldspar in 1932, a considerable tonnage of which was utilized by the company in the production of floor and wall tile.

Feldspar produced in Canada has generally been of the high potash, relatively low soda variety and has enjoyed during the past years a good market in the United States for the manufacture of enamels, electric porcelain and vitrified ware. About eighty per cent of the output has been exported to the United States but increased milling facilities in Canada and changes occurring in sources of supply and general industry have reduced the exports.

A report on feldspar by Hugh S. Spence of the Mines Branch, Ottawa, states: "Canadian feldspar generally tends to be fresher and more glassy and brittle than most of the commercial spar mined in some foreign countries. These properties, which are allied with high average quality as represented by uniformity of composition, high potash and alumina content, and freedom from impurities, have secured for Canadian feldspar an enviable reputation in those branches of the ceramic industry demanding a high grade product, such as white wares, floor tile, electrical porcelain, glass, etc. For many years, selected Canadian feldspar known in the trade as "No. 1 Canadian" has served as a standard of the highest grade of spar on the market. For most industrial uses, feldspar is required to be finely ground. The degree of fineness depends on the specifications set by the individual consuming industry. Much the larger part of production goes to the pottery and glass trades, with smaller amounts to the enamel-ware, brick and tile industries.

Analyses of Some Commercial Feldspars

	1	2	3	4	5	6	7
Silica.....	65.70	72.25	69.22	64.44	64.93	68.30	74.04
Alumina.....	18.88	16.05	17.91	18.10	19.45	17.25	14.60
Iron.....	0.05	0.11	0.09	0.10	0.06	0.08	0.06
Lime, magnesia.....	0.28	tr.	0.36	0.42	0.25	0.42	1.50
Soda.....	2.75	2.54	3.27	3.31	2.54	3.65	6.86
Potash.....	12.34	7.44	8.60	13.40	12.46	9.35	2.11

1—Quebec. 2—Maine. 3—New Hampshire. 4—Ontario. 5—N. Carolina potash feldspar.
6—N. Carolina potash-soda feldspar. 7—New York soda feldspar. (N.B. Davis).

It is interesting to note that feldspar is now being mined near Broken Hill, New South Wales. The mineral occurs as perthite in a pegmatite dike. It is a high-grade potash type, white, cream, salmon and pink in colour. The mining is by open cut and the crude product is shipped to Sydney. Western Australia reports 361 tons of feldspar exported in 1932; this was appraised at £1,399.

Quartz.—Production of quartz, including crushed quartzite and silica in other natural forms, totalled 189,132 tons valued at \$276,147 in 1932 as compared with 195,724 tons worth \$303,158 in 1931. Silica was produced in Quebec, Ontario, Manitoba, and British Columbia. Records indicate that it was utilized for a wide range of purposes including fluxing of metalliferous ores, manufacture of scouring compounds, electro chemical and electro metallurgical processes, glass manufacturing, moulding, brick making and artificial abrasive manufacture.

There are now several modern plants operating in Eastern Canada for the production of ground or crushed silica products and in Manitoba a natural silica sand is shipped to glass plants from a deposit located on Black Island, Lake Winnipeg.

In July of the present year a new mill of 300 tons daily capacity was put in operation at Lac Remi, Quebec. This plant is treating material from a large local deposit of kaolin and silica and producing pure kaolin for the ceramic, paper and other trades and pure silica for glass, sand-blasting and other purposes. The machinery has been so arranged that any desired amount of sand for foundry purposes can also be produced.

Table 205.—Capital Employed in the Feldspar and Quartz Mining Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment.....	980,287	831,620
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	87,907	4,904
(c) Inventory value of finished products on hand.....	23,959	77,679
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	250,515	21,974
Total.....	1,342,668	936,177

Table 206.—Employees, Salaries and Wages in the Feldspar and Quartz Mining Industry in Canada, 1931 and 1932

	1931				1932			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	23	2	25	\$ 31,462	18	2	20	\$ 32,462
Wage-earners.....	141		141	104,347	100		100	59,141
Total.....	164	2	166	135,809	118	2	120	91,603

Table 207.—Production of Feldspar in Canada, by Provinces, 1923-1932

(For the years 1890-1922 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
1923.....	12,026	\$ 102,779	17,199	\$ 134,822	29,225	\$ 237,601
1924.....	16,147	142,118	28,657	216,422	44,804	358,540
1925.....	11,287	94,730	17,394	141,059	28,681	235,789
1926.....	13,168	111,136	22,783	199,102	35,951	310,238
1927.....	12,730	104,618	17,119	154,533	29,849	259,151
1928.....	12,943	104,789	18,954	180,153	31,897	284,942
1929.....	15,790	133,492	21,737	206,979	37,527	340,471
1930.....	17,074	163,802	9,722	104,667	26,796	268,469
1931.....	10,381	86,842	7,962	100,119	18,343	186,961
1932.....	3,390	39,062	3,657	42,920	7,047	81,982

Table 208.—Production in Canada, Imports and Exports of Feldspar, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	17,074	163,802	10,381	86,842	3,390	39,062
Ontario.....	9,722	104,667	7,962	100,119	3,657	42,920
Total.....	26,796	268,469	18,343	186,961	7,047	81,982
IMPORTS (Crude and ground).....	3,177	53,341	1,877	37,297	1,487	24,875
EXPORTS.....	21,183	165,482	10,975	88,913	2,017	15,465

Table 209.—Production of Quartz in Canada, 1923-1932

(For the years 1890 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	264,076	599,250	1928.....	282,522	523,933
1924.....	150,896	323,156	1929.....	265,949	561,527
1925.....	197,224	363,612	1930.....	226,200	418,127
1926.....	232,082	553,161	1931.....	195,724	303,158
1927.....	233,984	496,364	1932.....	189,132	276,147

Table 210.—Production in Canada, and Imports of Quartz, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Nova Scotia.....	8,057	18,494	3,116	6,836		
Quebec.....	49,561	119,668	26,987	69,759	20,123	71,645
Ontario.....	167,487	274,674	97,888	148,642	66,135	93,574
Manitoba.....			67,214	76,624	87,253	102,493
British Columbia.....	1,095	5,291	519	1,297	15,621	8,435
Total.....	226,200	418,127	195,724	303,158	189,132	276,147
IMPORTS—						
Silica sand—for glass, etc.—	164,349	352,796	107,712	235,191	59,176	162,869
Silex or crystallized quartz, ground or un-						
ground.....	5,040	111,473	5,238	130,368	6,186	167,997
Flint and ground flint stones.....	3,878	37,811	2,616	23,653	1,926	16,075
Silica firebrick—90% silica.....		315,039		234,909		122,952

Table 211.—World Production of Feldspar, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom (China stone).....	62,920	42,650	45,091	France.....	12,600	(a)	(a)
Canada.....	23,925	16,378	6,292	Germany (Bavaria).....	5,069	4,921	3,494
Australia (including China stone).....	67	205	1,006	Italy.....	5,659	4,675	(a)
India.....		334	473	Norway.....	28,056	16,151	20,249
				Roumania (b).....	1,932	100	670
				Sweden.....	37,986	32,590	23,319
				United States (sales).....	171,788	147,119	104,715
				Argentina.....	193	169	363
				Egypt.....		26	176
FOREIGN COUNTRIES							
Czechoslovakia (c).....	30,000	30,000	30,000				
Finland (exports).....	611	66	1,505				

NOTE.—19,987 long tons of feldspar were produced in Russia during year ended September, 1928; later figures are not available.

(a) Information not available.

(b) Converted from cubic metres at the rate of 1 cubic metre=2 long tons.

(c) As estimated by the U.S. Bureau of Mines.

GYPSUM

The production of gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is one of Canada's oldest industries. Up to the beginning of this century, Nova Scotia, New Brunswick and Ontario constituted the producing provinces. Manitoba commenced production in 1901, and ten years later, gypsum mining was started in British Columbia.

Production of gypsum from Canadian deposits during 1932 amounted to 438,629 tons valued at \$1,080,379 as compared with 863,752 tons worth \$2,111,517 in 1931, a decrease of 49.2 per cent in quantity and 48.2 per cent in value. Gypsum quarried during the year totalled 439,695 tons of which 80,755 tons or 18.4 per cent was calcined in Canada.

There are about 52 distinct areas in Nova Scotia containing gypsum; these cover approximately 625 square miles. Anhydrite, the anhydrous calcium sulphate, also occurs in the Maritime Provinces, in Ontario, in Manitoba, Alberta and also in British Columbia. At present a considerable tonnage of anhydrite is exported from Nova Scotia to the Southern States where it is used principally as a fertilizer for the peanut crop. The statistics relating to Canadian anhydrite production are combined with those for gypsum.

Anhydrite has been used in large tonnages in Europe and the United States for fertilizer purposes, some consumers preferring it in place of gypsum, it being found especially satisfactory for leguminous forage crops such as clovers, alfalfas, etc., and also for peanuts. The use of anhydrite for the manufacture of ammonium sulphate has been successfully adopted both in Germany and England.

Nova Scotia.—In Nova Scotia the Connecticut Adamant Plaster Company quarried crude gypsum at Cheverie during 1932, the output of this company being exported to its own plant located at New Haven, Conn. Shipments were made by the Atlantic Gypsum Products Co.; this company shipped from both its Walton and Cheticamp deposits. At Newport Station, Hants Co., the Windsor Gypsum Co. quarried and shipped crude gypsum. Gypsum was also quarried by the Windsor Plaster Co. at its Brooklyn quarry and calcined at the company's mill at Windsor. The Nova Scotia Coal and Gypsum Co. made shipments of crushed gypsum from Mabou Harbour and at Baddeck Bay, Victoria county, the North American Gypsum Co. produced and shipped the mineral in crushed form. At Wentworth, in Hants county, the property of the Canadian Gypsum Company was in continuous operation throughout the year; shipments of both crude anhydrite and gypsum were made by the company.

New Brunswick.—In New Brunswick shipments of crude gypsum were made from deposits located at Plaster Rock, Petitediac and Hillsborough. At the last named place the Canadian Gypsum Company also produced calcined gypsum for the manufacture of gypsum products. The following information relating to the operations of this company is contained in the 1932 annual report of the Department of Lands and Mines of the Province of New Brunswick. "This is the largest plant of its kind in Canada and has for many years supplied Eastern Canada with calcined gypsum products. These include plaster in its various forms of hardwall plaster, plaster of Paris, dental plaster, wall board and gypsum tile. The making of wall board was begun about two years ago and has added materially to the business of the mill. The manufacture of gypsum tile including the hollow form for partitions and solid tile for roofs was begun in 1932. In former years shipments of the manufactured product went to Australia and New Zealand but this trade was lost in 1932 owing to adverse exchange. The English market for gypsum products is, however, opening up. The company reports that as great a number of men as possible were employed.

Ontario.—At Caledonia, the Gypsum, Lime and Alabastine, Canada, Ltd., conducted continuous underground and milling operations throughout 1932, shipments of both crude and calcined gypsum being made. Mining and milling operations were also conducted by the same company at Lythmore. Gypsum, Lime and Alabastine manufacture an extensive line of gypsum products some of which are: hardwall plaster, wood fibre plaster, coloured finishing plaster, beam and column fireproofing, roof and partition tile, building insulation and stucco.

The Canadian Gypsum Co. Ltd., carried on mining and milling operations at Hagersville during the twelve months of 1932. Crude gypsum shipments were made and calcined gypsum utilized for the manufacture of various gypsum products.

Manitoba.—Gypsum, Lime and Alabastine, Canada, Ltd., reports both quarry and mill operations in Manitoba for the twelve months of 1932. The quarry of this company is located at Gypsumville and the mill at Winnipeg. Shipments of crude gypsum were made by the company and calcined gypsum utilized for the manufacture of tile, wall board, etc.

Western Gypsum Products, Ltd., carried on both surface and underground operations at Amaranth. Crude lump and crushed gypsum were shipped and calcined gypsum consumed for the manufacture of wall board.

British Columbia.—At Falkland, the Gypsum, Lime and Alabastine, Canada, Ltd., operated throughout 1932. Crude gypsum was quarried and shipped; the company also employed calcined gypsum in the manufacture of gypsum products. No shipments of gypsum or gypsite were reported from the Clinton Mining Division; gypsum mining operations were previously recorded in this district.

A bulletin on the gypsum industry issued by the United States Bureau of Mines contains the following information:—

"New building construction of all kinds was at unprecedentedly low levels during 1932 and the total demand for gypsum products declined. There were practically no developments of major importance in the domestic gypsum products industry during the year. Most producers limited their efforts to retaining the present markets for standard gypsum products and only a few new products were reported, some of which were: a regular gypsum wall board, one side of which is covered with aluminium foil and is used for heat insulation; a wood veneered wall board and a lithographed wall board, the latter resembling wood grain. Another product introduced in the United States during the year which may play an important role in lowering the costs of certain types of construction is a wall board for exterior use.

According to trade notices, the International Gypsum Co., Ltd., was incorporated in St. Johns, Newfoundland, during the latter part of the year. Plans have been formulated for mining and crushing crude gypsum which will be exported to plaster mills on the Atlantic coast.

Table 212.—Capital Employed in the Gypsum Industry in Canada, by Provinces, 1931 and 1932

	1931			1932		
	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:						
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated value if rented.)	2,010,954	4,133,663	6,144,617	2,489,742	4,456,143	6,945,885
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	60,566	352,358	412,924	30,297	148,342	178,639
(c) Inventory value of finished products on hand.....	218,004	231,591	449,595	228,421	62,468	290,889
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	695,803	238,143	933,946	540,326	98,409	638,735
Total.....	2,985,327	4,955,755	7,941,082	3,288,786	4,765,362	8,054,148

Table 213.—Employees, Salaries and Wages in the Gypsum Industry in Canada, 1931 and 1932

	1931				1932			
	Number			Salaries and wages	Number			Salaries and wages
	Male	Female	Total		Male	Female	Total	
Salaried employees.....	52	12	64	\$ 131,887	40	6	46	\$ 90,418
Wage-earners—								
Mine.....	383		383		291		291	
Mill.....	229		229		141		141	
Total.....	612		612	\$ 524,703	432		432	\$ 278,066
Grand total.....	664	12	676	\$ 656,590	472	6	478	\$ 368,484

Table 214.—Annual Production of Gypsum in Canada, by Provinces, 1923-1932

(For the years 1874 to 1922 see Mineral Production of Canada, 1928)

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$		\$		\$
1923..	341,705	747,934	104,740	564,680	99,958	542,317	31,575	386,554	323	1,615	578,301	2,243,100
1924..	441,752	915,845	86,738	476,804	88,121	467,097	29,375	348,212	30	150	646,016	2,208,108
1925..	551,230	1,070,408	71,745	408,917	82,020	491,833	35,088	417,868	240	865	740,323	2,389,891
1926..	678,107	1,187,918	59,546	468,411	89,987	496,059	35,172	461,461	20,916	156,964	883,728	2,770,813
1927..	829,438	1,512,015	85,293	524,550	83,998	500,688	39,895	512,008	24,493	201,754	1,063,117	3,251,015
1928..	1,013,257	1,850,243	75,033	501,252	85,811	553,271	51,285	609,039	20,982	229,843	1,246,368	3,743,648
1929..	948,895	1,152,160	70,482	485,982	100,347	832,689	67,269	631,051	24,696	243,814	1,211,689	3,345,696
1930..	827,063	982,287	82,674	513,677	94,946	776,069	34,157	298,297	32,128	248,458	1,070,968	2,818,788
1931..	707,817	878,487	58,957	451,264	53,358	374,469	23,076	231,124	20,544	176,173	863,752	2,111,517
1932..	341,508	398,861	38,019	297,520	35,655	186,175	12,719	113,739	10,728	84,084	438,629	1,080,379

Table 215.—Summary of Statistics on Gypsum in Canada, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude gypsum mined.....	1,110,048		882,880		439,695	
Crude gypsum calcined.....	168,967		167,335		80,755	
PRODUCTION BY GRADES—						
†Crude—						
Lump.....	56,628	116,401	47,147	103,396	98,672	114,504
Crushed.....	845,210	973,623	693,764	791,910	268,645	314,336
Fine ground.....	8,160	38,894	4,418	21,392	1,826	10,459
(a) Calcined.....	160,970	1,689,870	118,423	1,194,819	69,486	641,080
Total.....	1,070,968	2,818,788	863,752	2,111,517	438,629	1,080,379
PRODUCTION BY PROVINCES—						
†Nova Scotia.....	827,063	982,287	707,817	878,487	341,508	398,861
New Brunswick.....	82,674	513,677	58,957	451,264	38,019	297,520
Ontario.....	94,946	776,069	53,358	374,469	35,655	186,175
Manitoba.....	34,157	298,297	23,076	231,124	12,719	113,739
British Columbia.....	32,128	248,458	20,544	176,173	10,728	84,084
Total.....	1,070,968	2,818,788	863,752	2,111,517	438,629	1,080,379
IMPORTS—						
Gypsum, crude (sulphate of lime).....	898	25,882	484	13,491	55	1,381
Plaster of Paris, or gypsum ground not calcined.....	219	5,352	158	4,476	171	3,434
Plaster of Paris, or gypsum calcined and prepared wall plaster.....	16,608	190,832	11,050	120,516	1,384	31,165
Total.....	17,725	222,066	11,692	138,483	1,610	35,980
EXPORTS—						
Gypsum or plaster crude.....	719,381	871,567	618,765	741,376	372,314	470,247
Plaster of Paris, ground and prepared wall plaster.....	7,282	119,092	3,085	50,774	798	13,979
Total.....	726,663	990,659	621,850	792,150	373,112	484,226

† Shipments of crude gypsum include some anhydrite produced in Nova Scotia.

(a) Does not include gypsum calcined in manufacturers' plants in Calgary and Montreal.

Table 216.—World Production of Gypsum, 1930-1932

(Supplied by *Imperial Institute*)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	838,208	754,895	995,462	Latvia (exports).....	36,077	32,014	37,759
Canada.....	991,114	788,286	392,585	Luxemburg.....	10,451	9,117	9,254
Union of South Africa.....	16,828	14,613	7,001	Roumania (b).....	50,442	52,166	39,386
Cyprus (estimated).....	12,000	15,300	12,000	Spain.....	(b)1,557,380	(g)1,295,576	(g)1,133,282
Palestine.....	1,635	483	1,458	Sweden.....	133	49	113
India.....	56,316	53,632	54,741	Algeria.....	93,283	74,416	37,374
Australia.....	51,085	27,732	(c) 51,050	Belgian Congo.....	.....	1,000	.....
Total.....	1,970,000	1,650,000	1,510,000	United States.....	3,099,458	2,284,837	1,210,017
FOREIGN COUNTRIES				Tunis.....	25,000	(a)	(a)
Austria (d).....	36,760	47,000	(a)	Argentina.....	48,667	38,849	33,013
Estonia.....	1,932	7,727	8,168	Chile.....	16,907	12,965	11,800
France.....	3,007,115	(a)	(a)	Peru.....	14,000	8,000	(a)
Germany.....	694,000	482,000	392,200	China.....	61,100	70,400	(a)
Poland.....	40,000	24,000	(a)	Cuba.....	26,800	(a)	(a)
Greece.....	2,730	6,400	(a)	Egypt (estimated)...	130,000	130,000	130,000
Italy (including alabaster)...	674,703	578,561	521,453	New Caledonia.....	3,082	11,365	11,719
Yugoslavia (Serbia only)...	1,440	759	(a)	Total.....	(f) 9,500,000	(a)	(a)
				Grand total.....	(f)11,500,000	(a)	(a)

(a) Data not available.

(b) Converted from cubic metres at the rate of 1 cubic metre=2 long tons.

(c) Excluding production of Victoria, which is not available, but amounted to 1,565 long tons during 1931.

(d) Estimated by Bundesministerium für Handel und Verkehr.

(f) Excluding the production of U.S.S.R. (Russia), which was recorded as 404,068 long tons during the year ended September, 1928, the latest year for which information is available.

(g) Including 407,047 cubic metres and 343,028 cubic metres of gypsum, also 60 cubic metres and 80 cubic metres of alabaster during 1931 and 1932 respectively, converted as per (b).

IRON OXIDES (OCHRE)

In 1851, an important deposit of ochre was worked at Pointe du Lac, St. Maurice county, Quebec, and shipments of dried ochre were made to the United States, subsequently this property was abandoned. Thirty-two years later the manufacture of dry ochre was commenced on a small scale in Iberville township on the Little Romaine river. This deposit was later abandoned but in 1916 it was re-opened and a small quantity of crude ochre was taken out for use as a pigment in the paper industry. A deposit was opened up at St. Malo, Champlain county, in 1885 and a calcining plant erected. Calcined ochre was shipped from the mill to Montreal where it was further prepared for use in the manufacture of paint.

Deposits of iron oxides in the Three Rivers district, Quebec, are important. The Canada Paint Company Limited, operates a large plant at Red Mill for calcining, washing and grinding pigments.

About one and a half miles east of Red Mill, the Champlain Oxide Company operated a calcining plant. No shipments have been made from this plant since 1923.

For a number of years Thos. H. Argall operated a calcining plant near the Champlain mill. Operations ceased due to labour troubles and this producer opened up another deposit at Pointe du Lac from which crude oxides are shipped for use in the purifying of illuminating gas.

The Montmorency Paint Products Company has abandoned its deposit at Beaupré, and have removed their plant to a new deposit at Les Forges, some seven miles north of Three Rivers. Operations are now being conducted at this new location.

Prior to 1911 small quantities of ochre were produced intermittently from a deposit at Campbellville, Halton county, Ontario. No production has been recorded in this province since that date.

Shipments of natural iron oxides (ochres) by Canadian producers totalled 5,240 tons valued at \$46,161 in 1932 as compared with 5,520 tons worth \$49,205 in 1931 and 6,596 tons at \$83,873 in 1930. Production of ochres in Canada during 1932 came entirely from the provinces of Quebec and British Columbia, the former province accounting for 95.7 per cent of the total tonnage.

A recent report issued by the Department of Mines, Quebec, states that the plant of the Canada Paint Company at Red Mill, near Three Rivers, was largely remodelled. New grinding machinery was installed and a cyclone collector system devised to produce a uniform size of dry oxide, grading 99 per cent through 300 mesh. Plans were under way to replace the old style of wood-burning kilns by modern electrical furnaces, mechanically controlled.

During 1931 the Sherwin Williams Company of Cleveland, Ohio, secured a controlling interest in the Sherwin Williams Company of Canada, of which the Canada Paint Company is a subsidiary. This, the Quebec Department of Mines states, should ultimately result in an increased volume of iron oxide exports to the United States.

The Montmorency Paint Products Company made ochre shipments in 1932 from their property northwest of Three Rivers. This company operates a modern grinding and calcining plant.

At La Pointe du Lac, St. Maurice county, Quebec, Thos. H. Argall excavated and shipped crude dried ochre throughout the greater part of 1932. Material from this property went to points both in Canada and the United States.

During 1932 iron oxides were shipped to Vancouver from a property near Mons, British Columbia; these were utilized for the purification of city gas.

Table 217.—Capital Employed in the Iron Oxides Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment..... (Estimated value if rented)	137,463	152,144
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	16,194	21,916
(c) Inventory value of finished products on hand.....	2,644	31,726
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	25,234	1,077
Total.....	181,535	206,863

Table 218.—Employees, Salaries and Wages in the Iron Oxides Industry in Canada, 1931 and 1932

Class	1931		1932	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
Salaried employees.....	2	\$ 3,800	1	\$ 3,240
Wage-earners.....	28	25,394	25	19,669
Grand total.....	30	29,194	26	22,909

Table 219.—Production of Iron Oxides in Canada, 1923-1932

(For the Years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	10,424	129,636	1928.....	5,414	111,198
1924.....	7,266	91,160	1929.....	6,518	115,932
1925.....	7,118	91,913	1930.....	6,596	83,873
1926.....	6,626	101,843	1931.....	5,520	49,205
1927.....	6,125	103,536	1932.....	5,240	46,161

Table 220.—Production in Canada, Imports and Exports of Iron Oxides, 1931-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	6,596	83,873	5,520	49,205	5,240	46,161
IMPORTS—						
Ochres, ochrey earths, siennas, and umbers.....	2,413	75,596	1,666	57,825	1,212	41,806
Oxides, fire proofs, rough stuffs, fillers and colours, dry, n.o.p.....	3,392	697,331	3,170	639,863	2,359	616,124
EXPORTS—						
Mineral pigments, iron oxides and ochres..	417	32,798	742	50,951	785	55,306

MICA

Mica production in Canada during 1932 amounted to 309 tons valued at \$6,828 as compared with 1,339 tons worth \$54,066 in 1931 and 1,170 tons at \$96,004 in 1930. The total Canadian production in 1932 came from deposits in Quebec and Ontario. Adverse conditions in general industry and more especially in the field for the manufacture of electrical equipment are responsible for the almost continuous decline in Canadian mica production during recent years. It is, however, encouraging to note that there was an increase of 32·9 per cent in the tonnage and 149·5 per cent in the value of mica produced in Canada during the first six months of 1933 as compared with the corresponding period of 1932.

Muscovite and phlogopite are two commercially important varieties of mica found in Canada. Muscovite occupies a minor position of economic importance as compared with the latter variety. Important deposits of phlogopite mica occur in the provinces of Quebec and Ontario. Quebec deposits are principally in Hull and Papineau counties, adjacent to the Lièvre and Gatineau rivers. In Ontario the more important occurrences are in Frontenac, Lanark and Leeds counties. Plants for the sorting and grading of the mineral are operated in both provinces. Various grades of ground mica are now produced in the province of Quebec. Mica has been known for many years to occur in considerable quantity in the granite near Neil's Harbour, Victoria county, Nova Scotia; several test pits were sunk here but no commercial production reported. Lepidolite, or lithia mica, in deposits of possible economic value, occur in the Pointe du Bois district, northeast of Winnipeg, in Manitoba. The lepidolite of the Manitoba deposits has no value as sheet mica. Fuchsite (chrome mica) schist has been shipped from this same district. It was crushed and used in Winnipeg for stucco purposes. This is believed to be the only case on record of fuchsite being mined and utilized commercially. Some interesting occurrences of mica have been discovered recently in the neighbourhood of Okanagan Lake, in British Columbia, and similar deposits have been known for several years near Armstrong and also near Cherryville. The Department of Mines, British Columbia, reports that the Armstrong deposit is quite extensive and warrants exploration to prove its economic importance.

The Mines Branch, Ottawa, states that almost the entire recorded world's production of sheet mica is utilized in the electrical industries; a certain amount of clear sheet muscovite finds employment in stove doors, shields and shades, gas masks, etc. Ground mica finds various uses—the roofing industry probably absorbs the greater part of the ground mica produced. Coarsely ground mica, chiefly muscovite, is used for Christmas tree "snow". The finest grade of ground mica is taken up by the wall paper trade where it is used to impart lustre to the paper. Ground mica is also used, for its decorative effect, to surface stucco and plaster, and in concrete. The rubber trade uses a considerable amount of ground mica in the manufacture of tires, the mica serving as a lubricating or dusting medium during stages of manufacture.

The United States Bureau of Mines reports that the domestic unmanufactured sheet mica industry in the United States, which has steadily declined since 1929, reached a point in 1932 which was lower than for any year since 1919. The total quantity of domestic sheet mica marketed in the United States in 1932 was 338,997 pounds (169 tons) valued at \$45,882. Compared

with 1931 decreases of 65 per cent in quantity and 59 per cent in value were recorded. In 1932 domestic commercial production of ground mica was 15,409,846 pounds valued at \$310,840 compared with 15,613,052 pounds worth \$436,436 in 1931. Imports of ground mica in 1932 were 111,771 pounds valued at \$383. There was little demand in 1932 for any class of domestic mica. Total imports of unmanufactured mica for consumption in the United States in 1932 were 2,970,742 pounds valued at \$78,496; corresponding figures for 1931 were 4,549,122 pounds valued at \$132,865.

Consumption of Indian, Canadian and Madagascar mica splittings in the United States during 1931 and 1932 was as follows:—

—	Indian		Canadian		Madagascar	
	Pounds	\$	Pounds	\$	Pounds	\$
1931.....	1,713,954	648,169	163,091	52,258	162,545	63,443
1932.....	671,647	193,854	73,810	13,655	157,528	61,321

Exports of mica (splittings and blocks) from India during 1930, 1931 and 1932, were as follows:—

—	1930		1931		1932	
	Cwt.	\$	Cwt.	\$	Cwt.	\$
To United Kingdom.....	38,478	728,943	22,891	488,008	22,389	377,447
Germany.....	7,788	98,723	3,831	40,769	5,013	48,596
France.....	5,050	61,515	4,810	19,883	788	17,798
United States.....	23,982	512,559	12,378	145,794	11,264	110,493
Other countries.....	7,611	137,810	9,056	147,331	7,567	125,166
Total.....	82,909	1,539,550	52,966	841,785	47,021	679,500

Table 221.—Capital Employed in the Mica Mining Industry in Canada, by Provinces, 1931 and 1932

—	1931			1932		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY:						
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment..... (estimated if rented)	19,352	66,722	86,074	19,352	27,037	46,389
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	35,502	61,739	97,241	34,216	1,653	35,869
(c) Inventory value of finished products on hand.....		45,073	45,073		914	914
(d) Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	40,464	7,504	47,968	35,255	1,243	36,498
Total.....	95,318	181,038	276,356	88,823	30,847	119,670

Table 222.—Employees, Salaries and Wages in the Mica Mining Industry in Canada, 1931 and 1932

—	1931		1932	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
		\$		\$
Salaried employees.....	3	5,770	1	1,750
Wage-earners.....	25	16,786	8	6,114
Total.....	28	22,556	9	7,864

Table 223.—Production of Mica in Canada, by Provinces, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1923.....	1,545	216,684	1,980	110,290	3,525	326,974
1924.....	1,677	185,020	2,414	172,252	4,091	357,272
1925.....	2,415	178,800	1,605	82,663	4,020	261,463
1926.....	1,664	170,118	881	50,086	2,545	229,204
1927.....	1,454	99,194	1,284	75,183	2,738	174,377
1928.....	1,101	54,224	2,559	32,944	3,660	87,168
1929.....	1,062	72,630	2,991	45,919	4,053	118,549
1930.....	430	61,729	740	34,275	1,170	96,004
1931.....	290	30,601	1,049	23,465	1,339	54,066
1932.....	41	4,076	268	2,752	309	6,828

Table 224.—Production of Mica in Canada, by Grades, 1931 and 1932

	1931			1932		
	Pounds	Value f. o. b. shipping point	Price per pound	Pounds	Value f. o. b. shipping point	Price per pound
		\$	\$		\$	\$
Rough cobbled.....						
Thumb-trimmed.....	49,835	5,717	0.11	2,019	1,254	0.62
Splittings only.....	37,475	14,398	0.38	3,350	2,014	0.60
Scrap.....	2,589,918	33,951	0.01	612,980	3,560	0.06
Total.....	2,677,228	54,066		618,349	6,828	

Table 225.—Production in Canada, Imports and Exports of Mica, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	430	61,729	290	30,601	40	4,076
Ontario.....	740	34,275	1,049	23,465	269	2,752
Total.....	1,170	96,004	1,339	54,066	309	6,828
IMPORTS—						
Mica and manufactures of, n.o.p.....		102,775		92,294		71,749
EXPORTS—						
Rough-cobbled and thumb-trimmed.....	2	1,461	24	3,428	1	177
Splittings.....	39	35,351	19	14,672	50	26,833
Scrap and waste.....	1,039	48,436	1,232	32,600	300	2,843
Plate and manufactures (micanite).....		1,289		797		1,260
Total.....		86,537		51,497		31,113

Table 226.—World Production of Mica, 1930-1932

(Supplied by Imperial Institute)

(Long tons)

Country and description	1930	1931	1932	Country and description	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES			
Northern Rhodesia.....	4	1	.....	Norway.....	48	15	31
Southern Rhodesia.....	162	66	13	Sweden.....	72	64	60
Tanganyika Territory.....	21	9	12	Madagascar—			
Union of South Africa (b)...	878	843	242	Muscovite.....	20	14	88 (lb)
Canada—				Phlogopite.....	322	217	136
Rough-cobbed.....	20	.....	.....	United States (sales)—			
Thumb-trimmed.....	4	22	1	Sheets (uncut).....	654	430	151
Splittings.....	34	17	2	Scrap.....	6,011	5,912	6,286
Scrap.....	987	1,156	274	Argentina.....	98	50	54
Ceylon (exports).....	.....	2	2	Brazil (exports).....	51	54	41
India (exports)—				Korea.....	28	17	(a)
Sheet.....	741	414	335	Guatemala (c).....	(8 cwt.)	.....	.....
Splittings.....	3,404	2,235	2,016				
Australia.....	26	29	30				
Nigeria.....	(8 cwt.)	(17 cwt.)	(17 cwt.)				

NOTE.—1,469 long tons of mica were recorded as produced in U.S.S.R. (Russia) during year ended September 1928—later figures are not available.

(a) Information not available.

(b) Nearly all scrap.

(c) Imports into the United States from Guatemala.

The following amounts of lithia mica were produced:—

	1930	1931	1932	
South West Africa.....	250	100	.....	long tons
Czechoslovakia.....	30	7	(a)	"
Germany.....	773	404	(a)	"
Portugal.....	269	564	2,014	"

SALT

The production of salt in the province of Ontario was first recorded in 1866 when a company was formed to drill for oil on the north bank of the Maitland river, and, while no success attended the efforts of the drillers in their search for oil, a bed of rock salt was found at a depth of 964 feet. In September, 1866, this company (incorporated under the name of the *Goderich Petroleum Company*, later changed to *Goderich Salt Company*) commenced pumping brine. In the initial working in connection with these deposits the refining was done by the kettle method, which was soon discarded and replaced by the pan method of evaporation. Wells were drilled and plants erected at Clinton and Seaforth, Ontario, and four refineries were in operation at Goderich in 1879; at the present time there are only two firms operating at Goderich.

Census reports show that there were 16 salt works in operation in Ontario and 2 in Nova Scotia during 1871. According to the 1881 census, 26 plants were in operation in Ontario and 1 each in Nova Scotia and New Brunswick.

Salt production in Canada during 1932 amounted to 263,543 short tons valued at \$1,947,551 as compared with 259,047 tons worth \$1,904,149 in 1931. This represents an increase of 1.7 per cent in quantity and 2.3 per cent in value and not only emphasizes the sound basis upon which this Canadian industry is established but reflects great credit to the salt producers of the Dominion who were able to record progress throughout such a period of adverse industrial conditions.

During 1932 salt was produced in Nova Scotia, Ontario and Manitoba. In Nova Scotia the Malagash Salt Company mined and crushed mineral salt and produced various grades of salt products. At Amherstburg, Ontario, the Brunner, Mond Canada, Limited, produced saturated lime solutions for chemical purposes. Several grades of salt were manufactured at Sarnia, Ontario, by the Dominion Salt Company; vacuum pans and grainers were employed by this company. Vacuum and open pan processes were utilized by the Goderich Salt Company in the production of various grades of salt at Goderich, Ontario. Canadian Industries Limited operating at Sandwich, Ontario, employed triple effect vacuum pans for the manufacture of fine salt and grainers for the production of coarse grades; the electrolytic process was utilized by the company in making caustic soda and other chemicals from brine. Exhaust steam was used at Goderich, Ontario, by Western Canada Flour Mills Company in the manufacture of different

salt products marketed by this company. The first official statistics of systematic salt production on a regular commercial scale in Manitoba were recorded in 1932 when the Neepawa Salt Company reported production for the first time; at Simpson in Saskatchewan the Simpson Oil Company was reported to be preparing to produce salt in 1933.

The Canadian salt companies now produce an extensive variety of high grade products; various table salts, including free running and iodized are of equal quality with the better brands produced throughout the world, other grades are manufactured and marketed for dairy, crop, highway, chemical, fishery and other purposes. It is interesting to note that smoked salt is now produced in Canada. Exports of Canadian salt in 1932 totalled 11,253,900 pounds as against 12,251,700 pounds in 1931, the greater part of this going to the United States, New Zealand and Newfoundland.

Mr. A. R. Chambers of the Malagash Salt Company, New Glasgow, states in the "Canadian Engineer" that salt and its effects on gravel and earth roads has been under almost daily observation by the engineers of the Malagash Salt Company during summer seasons since the year 1926. Interesting experiments were conducted in the use of salt-clay surfaces. The salt-clay surface remains dustless if the surface is maintained and does not appear to depend upon gathering moisture from the air to do so. In view of the cheapness of this type of highway, it is hoped that the resetting properties of the salt and clay which permit easy patching and complete reworking of the surface as desired, will overcome some of the objections to hard surfaced highways other than those of the permanent or semi-permanent type.

Experiments conducted at the Sandwich, Ontario, plant of Canadian Industries Limited by engineering experts indicate that salt mixed with sand will maintain sand piles (especially along highways) in the desired condition through all ordinary conditions of frost. Salt gives satisfactory protection against freezing and anchors the sand when applied to the road.

The United States Bureau of Mines reports that evaporated salt, which represented 32 per cent of the total sales in 1932, amounted to 2,061,215 short tons valued at \$13,166,795, a decrease of 6 per cent in quantity and 7 per cent in value from 2,203,690 tons valued at \$14,177,116 in 1931. Rock salt, which represents 25 per cent of the salt produced in 1932 amounted to 1,616,315 short tons valued at \$4,928,622, a decrease of 13 per cent in quantity and 14 per cent in value from the output of 1,854,170 tons valued at \$5,735,207 reported in 1931. The salt content of brine produced by chemical companies and used by them amounted to 2,769,821 short tons in 1932, this was 43 per cent of the total United States salt production and represents a decrease of 16 per cent in quantity from the output of 3,300,210 tons in 1931. Michigan, New York, Ohio, Kansas, Louisiana and California, in order named, are the largest producers of salt in the United States. In 1932 the bromine recovered in the United States by the producers from natural brine and the bromine content of bitterns used by producers in the manufacture of bromine compounds was 5,727,561 pounds valued at \$1,182,569. Michigan, California, West Virginia and Ohio were the states producing bromine.

The Chemical Trade Journal and Chemical Engineer, London, report that an experimental factory for the production of ammonia soda, utilizing sea-water as the source of the sodium chloride, has been erected in Norway by the Norsk Hydro Elektrisk Kvaelfstof, A.B. If the plant proves satisfactory the company will build a large plant at Heroya capable of producing 18,000 tons per annum of soda ash. Probably the whole of the initial output of this plant will be used by the Norsk Hydro itself in the production of synthetic sodium nitrate and to replace imported soda ash.

Table 227.—Capital Employed in the Salt Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	3,392,506	3,055,911
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	181,065	163,760
(c) Inventory value of finished products on hand.....	89,549	80,365
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	533,807	504,972
Total	4,196,927	3,805,008

Table 228.—Employees, Salaries and Wages in the Salt Industry in Canada, 1931 and 1932

	1931				1932			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
Salaried employees.....	41	16		\$ 112,479	46	16		\$ 133,449
Wage-earners.....	306		57	334,505	246	37	62	321,600
Total.....	347	16	363	446,984	292	53	345	455,049

Table 229.—Production of Salt in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	202,397	1,713,516	1928.....	299,445	1,495,971
1924.....	207,979	1,374,780	1929.....	330,264	1,578,086
1925.....	233,746	1,410,697	1930.....	271,695	1,694,631
1926.....	262,547	1,480,149	1931.....	259,047	1,904,149
1927.....	268,672	1,614,667	1932.....	263,543	1,947,551

Table 230.—Production of Salt in Canada, by Grades, 1931-1932

Grade	1931			1932		
	Manu- factured	Sold	Value of salt sold (not including containers)	Manu- factured	Sold	Value of salt sold (not including containers)
	Tons	Tons	\$	Tons	Tons	\$
Table, dairy and pressed blocks.....	57,250	57,294	1,126,378	61,168	60,128	1,194,649
Common fine.....	55,510	57,886	339,459	58,472	59,036	349,571
Common coarse.....	44,295	45,326	326,970	44,757	47,499	304,482
Land salt.....	542	527	1,861	583	583	2,349
Other grades.....	56	56	259	55	55	258
Brine for chemical works (salt equivalent sold or used).....	97,958	97,958	99,222	96,242	96,242	96,242
Total.....	255,611	259,047	1,904,149	261,277	263,543	1,947,551
Value of containers.....			491,357			560,413
Grand Total.....	255,611	259,047	2,395,506	261,277	263,543	2,507,964

Table 231.—Production in Canada, Imports, Exports and Consumption of Salt, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	271,695	1,694,631	259,047	1,904,149	263,543	1,947,551
IMPORTS—						
Salt, for the use of the sea or gulf fisheries	56,133	195,760	56,166	248,155	27,798	100,939
Salt, in bulk, n.o.p.....	40,910	169,948	40,323	177,738	39,065	177,623
Salt, n.o.p., in bags, barrels, etc.....	31,273	273,448	34,107	309,203	34,990	307,195
Salt, table, made by an admixture of other ingredients, when containing not less than 90 per cent of pure salt.....	69	21,747	294	16,842	180	10,197
Total.....	128,385	660,903	130,890	751,938	102,033	595,954
EXPORTS.....	8,758	74,397	6,126	55,110	5,627	36,248
APPARENT CONSUMPTION OF SALT.....	391,322	2,281,137	383,816	2,600,977	359,949	2,507,257

Table 232.—World Production of Salt, 1930-1932

(Long tons)

(Supplied by *Imperial Journal*)

Producing country and description	1930	1931	1932
BRITISH EMPIRE			
United Kingdom—			
Rock-salt.....	25,023	21,553	19,567
Brine-salt.....	2,042,541	1,876,011	2,196,632
Malta.....	1,200	1,170	1,200
Mauritius (estimated)—			
Sea-salt.....	1,500	1,500	1,500
Nigeria (estimated).....	400	400	400
Somaliland (exports)—			
Sea-salt.....	1,032	115	2,003
South West Africa.....	503	1,076	2,069
Anglo-Egyptian Sudan.....	14,082	11,256	(a)
Tanganyika Territory—			
Brine-salt.....	5,774	4,378	6,607
Sea salt.....	785	2,359	
Uganda.....	1,751	1,878	(a)
Union of South Africa (years ended June 30).....	87,928	(a)	(a)
Canada.....	241,493	228,224	233,283
British West Indies (exports)—			
Sea-salt.....			
Bahamas.....	3,143	12,250	250
Grenada.....	153	129	(a)
Leeward Islands.....	1,517	2,316	759
Turks and Caicos Islands.....	41,541	26,929	20,625
Ceylon.....	9,533	44,819	17,703
Cyprus (estimated).....	3,000	3,000	3,000
India (including Aden)—			
Rock-salt.....	175,467	161,893	172,043
Salt.....	1,535,881	1,677,507	1,438,818
Palestine—			
Rock-salt.....	1,373	1,239	964
Sea-salt.....	6,006	(a)	(a)
Australia—			
Victoria (estimated).....	50,000	50,000	50,000
Western Australia.....	(b) 8,000	3,938	2,771
South Australia.....	58,766	68,666	60,063
Total.....	4,300,000	4,300,000	4,300,000
FOREIGN COUNTRIES			
Austria—			
Rock-salt.....	1,046	848	799
Brine-salt.....	154,086	120,675	167,876
Bulgaria—			
Rock-salt.....	1,677	3,800	(a)
Sea-salt, etc.....	31,142	(a)	(a)
Czechoslovakia—			
Rock-salt.....	169,548	182,023	174,611
Brine-salt.....	5,339	5,152	
France—			
Rock-salt and brine-salt.....	1,723,227	1,381,279	1,407,071
Sea-salt.....	244,241	359,000	168,000
Germany—			
Rock-salt.....	2,416,822	2,053,925	2,082,274
Brine-salt.....	493,341	483,221	477,713
Greece—			
Sea-salt (estimated).....	100,000	100,000	100,000
Italy—			
Rock-salt.....	71,939	63,373	327,066
Brine-salt.....	254,819	258,634	
Sea-salt.....	509,578	746,101	
Netherlands (sales).....	49,020	55,254	59,805
Poland.....	525,833	552,000	380,648
Portugal—			
Rock-salt.....		24	21,000
Roumania—			
Rock-salt.....	299,963	250,784	283,520
Sea-salt.....	2,121		
Spain—			
Rock-salt.....	161,933	152,993	150,272
Brine-salt and sea-salt.....	859,178	722,270	793,780
Switzerland.....	79,554	83,674	(a)
U.S.S.R. (Russia).....	3,154,300	2,804,200	(a)
Yugoslavia (f).....	53,773	51,850	52,119
Algeria—			
Rock-salt and sea-salt.....	57,527	58,622	58,799
Abyssinia (estimated).....	10,000	10,000	10,000
Angola (estimated).....	10,000	10,000	10,000
Belgian Congo (estimated).....	80	80	80
Canary Islands (estimated).....	2,000	2,000	2,000
Cape Verde Islands.....	12,200	10,900	(a)
Egypt (exports).....	152,406	101,248	132,906
French Morocco.....	8,000	8,000	8,000
French Somaliland.....	25,000	14,000	(b) 30,306
French West Africa.....	2,155	6,000	1,565
Italian East Africa (estimated).....	100,000	100,000	100,000

Table 232.—World Production of Salt, 1930-1932—Concluded

Producing country and description	1930	1931	1932
FOREIGN COUNTRIES—Con.			
Tripoli (estimated).....	20,000	20,000	20,000
Tunis.....	118,400	119,272	90,817
Mexico (estimated).....	80,000	80,000	80,000
Netherlands West Indies.....	7,353	9,272	(a)
Panama (estimated)—			
Crude salt.....	50,000	50,000	50,000
United States—			
Rock-salt.....	1,765,509	1,655,509	1,443,138
Brine-salt.....	3,320,054	2,946,616	2,473,054
Evaporated salt.....	2,105,902	1,967,580	1,840,371
Argentina.....	142,309	156,855	178,277
Chile.....	38,997	(a)	26,190
Colombia (estimated).....	77,000	77,000	77,000
Ecuador—			
Rock-salt.....	124	144	(a)
Other salt.....	24,047	12,929	(a)
Peru.....	30,000	28,000	(a)
Venezuela.....	20,395	(a)	(a)
China, including Kwantung Peninsula.....	2,562,500	2,235,000	(a)
Formosa.....	160,639	195,905	103,588
French Indo-China (estimated).....	160,000	160,000	160,000
Iraq (d).....	8,801	7,430	(a)
Japan (c).....	618,753	513,029	(a)
Korea.....	136,000	136,000	(a)
Netherlands East Indies—			
Government production.....	308,626	209,019	204,340
Native production.....	30,786	31,206	28,211
Philippine Islands—			
Brine-salt and sea-salt.....	39,931	41,898	(a)
Portuguese India (estimated).....	12,000	12,000	12,000
Siam (d)—			
Brine-salt.....	22,601	193,298	(a)
Sea-salt.....	155,543		
Turkey (estimated).....	160,000	160,000	160,000
Total.....	24,000,000	22,000,000	21,000,000
World's Total.....	28,000,000	26,000,000	25,000,000

Salt is also produced in many countries for which statistics are not available—e.g. Gold Coast, Kenya, Brazil, Bolivia.

(a) Information not available.

(b) Estimated.

(c) Excluding production from salt beds, which, although on government beach lands, have no fixed areas. Figures refer to years ended March 31 following that stated.

(d) Years ended March 31 following that stated.

(f) Excluding sea-salt.

TALC AND SOAPSTONE

Shipments of talc and soapstone ranging from 50 tons to 1,420 tons were made from Canadian deposits during the period 1886 to 1906. Prior to 1900 the production consisted mainly of impure talc and soapstone shipped from Quebec. It was not until 1900 that mining operations were commenced on the high grade talc deposits of the Madoc district. Ground talc was shipped from this district in 1906. Production advanced during the ensuing years until 1920 the high mark for the industry was reached, namely 21,671 tons valued at \$166,934, an average of \$7.70 per ton.

The production of talc and soapstone in Canada during 1932 was valued at \$159,038 as compared with an output worth \$157,083 in 1931 and \$186,216 in 1930. It is worthy of note that the Canadian talc and soapstone industry realized a 1.2 per cent increase in the value of their 1932 output over that for the preceding year.

Soapstone is produced in Quebec by the Broughton Soapstone and Quarry Co. Ltd. This company was in continuous operation throughout the year. Production consists of sawn blocks used as a refractory lining for alkali recovery furnaces in pulp mills, and of powdered material which finds a market as filler in various industries and in the manufacture of putty.

High grade talc was mined in Hastings county, Ontario, by the Canada Talc Company, Ltd., and Henderson Mines, Ltd.; refined talc was produced during the year near Madoc, Ontario, by Geo. H. Gillespie & Co. Ltd., and the Canada Talc Co. Ltd. This product was shipped to

points in Canada, the United States and Europe. The preparation of the mineral for the market includes crushing, drying, grinding and bolting. Talc was also produced at Anderson Lake in British Columbia by the B.C. Refractories Ltd.; this company employs air flotation in the processing of commercial grades of the mineral.

The physical characteristics of talc largely determine its economic importance. Talc is now utilized in cosmetic manufacture, paper making, paint, rubber and textile filling, ceramic and glass manufacture, insulating, lubrication, making of refractory facings, roofing, and dusting coal mines. In its natural form it can be shaped and baked into electrical fittings. Some of these so-called "lava" products become extremely hard after heat treatment. The mineral is also used in the manufacture of crayons, pencils, etc.

The total imports of talc or soapstone, French chalk, crude, manufactured or ground, for consumption in the United States in 1932 amounted to 19,978 short tons valued at \$357,109, representing decreases of 15 per cent in quantity and 18 per cent in value compared with 1931.

Imports into the United States from Canada, France and Italy during 1931 and 1932, were as follows:—

	1931		1932	
	Short tons	\$	Short tons	\$
Canada.....	6,829	67,817	6,378	58,097
France.....	8,020	94,556	5,952	76,436
Italy.....	7,707	207,542	6,917	190,068

Talc prices, United States, September, 1933, were as follows:—New Jersey f.o.b. works carload lots, per ton, containers included, mineral pulp ground, \$10 to \$12. New York, per ton, double air-floated, short fibre, 200 mesh, f.o.b. works, \$13.75; 325 mesh, \$14.75; Vermont, 99 per cent through 200 mesh, extra white, bulk basis, per ton, f.o.b., \$8.50; 97 to 98 per cent through 200 mesh, medium white, \$8; packing in paper bags \$1 per ton extra. Virginia, 200 mesh, \$4.40 to \$4.70; \$325 mesh, \$6.20 to \$7; crude, \$3.

Table 233.—Capital Employed in the Talc and Soapstone Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	561,411	642,873
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	13,575	9,868
(c) Inventory value of finished products on hand.....	4,050	9,653
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	39,554	41,138
Total.....	618,590	703,532

Table 234.—Employees, Salaries and Wages in the Talc and Soapstone Industry in Canada, 1931 and 1932

	1931				1932			
	Number of employees		Total	Salaries and wages	Number of employees		Total	Salaries and wages
	Male	Female			Male	Female		
				\$				\$
Salaried employees.....	5	2	7	23,275	6	2	8	20,422
Wage-earners.....	63		63	48,512	75		75	56,155
Total.....	68	2	70	71,787	81	2	83	76,577

Table 235.—Production of Talc and Soapstone in Canada, 1923-1932

(For the years 1888 to 1922 see Mineral Production of Canada 1928)

Year	Value	Year	Value
	\$		\$
1923.....	150,507	1928.....	219,358
1924.....	154,480	1929.....	229,198
1925.....	205,835	1930.....	186,216
1926.....	217,195	1931.....	157,083
1927.....	236,105	1932.....	159,038

Table 236.—Production in Canada, Imports and Exports of Talc and Soapstone, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Soapstone.....		50,168		34,439		46,751
Talc.....	11,841	136,048	11,836	122,644	12,103	112,287
Total		186,216		157,083		159,038
IMPORTS—						
Talc or soapstone, ground or unground..	4,799	85,779	2,670	49,452	1,900	49,774
EXPORTS—						
Talc.....	8,512	98,855	7,852	83,765	7,806	85,790

Table 237.—World Production of Talc, 1930-1932

(Supplied by Imperial Institute.)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	185	160	258	Greece.....	252	476	(a)
United of South Africa.....	349	210	248	Italy.....	37,491	37,800	31,859
Canada sales (g).....	10,572	10,568	10,806	Norway.....	14,759	11,212	13,783
India.....	6,857	5,135	6,512	Roumania (d).....	3,300	3,020	1,770
Australia.....	681	846	1,347	Spain (b).....	3,621	4,488	4,577
FOREIGN COUNTRIES				Sweden.....	5,036	4,662	4,454
Austria (estimated).....	25,000	25,000	25,000	Morocco (French) (exports)	552	682	824
Finland.....	2,803	3,000	(a)	United States (sales) (c)...	160,165	146,207	110,019
France.....	84,500	(a)	(a)	Uruguay (exports).....	1,440	1,761	2,584
Germany (Bavaria).....	5,702	4,142	3,147	China.....	26,000	22,000	(a)
				Egypt.....			228

NOTE.—5,480 long tons of talc were recorded as produced in Russia during year ended September 1928—later figures are not available.

(a) Information not available.

(b) In addition the following were quarried, 1,770 and 2,038 cubic yards in 1930 and 1931 respectively; and 1,936 cubic yards in 1932.

(c) Excluding steatite, figures of which are not available for publication.

(d) Converted from cubic metres at rate of 1 cubic metre equals 2 long tons.

(g) Excluding soapstone which is only recorded by value and was as follows:—

1930.....	£10,300
1931.....	£ 8,600
1932.....	£11,700

MISCELLANEOUS NON-METAL MINING INDUSTRIES

Included in this chapter are the following non-metallic minerals:

Actinolite	Manganese, bog
Barytes	Mineral waters
Bituminous sands	Natro-alunite
Fluorspar	Phosphate
Graphite	Pyrites
Lithium minerals	Silica brick
Magnesitic dolomite	Sodium carbonate
Magnesium sulphate	Sodium sulphate

Statistics relating to capital and labour are combined for these industries and are shown in Tables 238 and 239.

In addition to the foregoing, data are also shown for production, imports and exports of sulphuric acid and sulphur.

Table 238.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1931 and 1932

	1931	1932
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	4,964,737	1,755,102
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	108,324	54,015
(c) Inventory value of finished products on hand.....	211,817	174,848
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	173,052	88,948
Total.....	5,457,930	2,072,913

Table 239.—Employees, Salaries and Wages in the Miscellaneous Non-Metal Mining Industries, 1931 and 1932

	1931			1932		
	Number of employees		Salaries and wages	Number of employees		Salaries and wages
	Male	Female		Male	Female	
Salaried employees.....	37	4	41	29	6	35
Wage-earners.....	234		234	147		147
Total.....	271	4	275	176	6	182
			297,394			155,166

ACTINOLITE

Actinolite, which is a calcium-magnesium-iron silicate, is used in the manufacture of coal-tar roofing compounds. Mining of this mineral in Canada commenced in 1883.

The production of actinolite in Canada has been confined to the townships of Elzevir and Kaladar in Hastings and Addington counties, Ontario. There was no production of this mineral during 1932; in 1931 the output of actinolite totalled 35 tons valued at \$456; this was crushed and pulverized and, after mixing with mica, was exported to the United States. Actinolite, often with mica, is utilized in the manufacture of coal tar roofing compounds.

Table 240.—Production of Actinolite in Canada, 1923-1932

(For production from 1897 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
1923.....	53	\$ 583	1928.....	70	\$ 875
1924.....	90	1,225	1929.....	30	375
1925.....	40	500	1930.....	34	437
1926.....	80	1,000	1931.....	35	456
1927.....	86	1,075	1932.....		

BARYTES

Deposits of barytes at Five Islands, Colchester county, and Brookfield, Hants county, Nova Scotia, were first operated between 1865 and 1870. These deposits have produced about 5,000 tons of barytes. The McKellar Island deposit in Thunder Bay District, Ontario, in the course of its operations produced several thousand tons of this mineral. Large deposits of barytes at Lake Ainslie, Cape Breton Island, were opened up in 1894 and operations in this district have been practically continuous since that date. Between 1900 and 1903 the Cap Rouge deposit in North Cheticamp district was operated. In 1918 a deposit in Langmuir township, Ontario, was active and a mill for grinding and preparing barytes completed. Development work was done on the Bellew mine in North Burgess township, Ontario, in 1918. A deposit near Tienaga station was also operated in 1923 and 200 tons of barytes shipped. There was no production of barytes reported in Canada during 1932; in 1931 the output of this mineral in the Dominion came entirely from the Lake Ainslie mine in Nova Scotia. In 1932 experimental milling of barytes was conducted in Langmuir township, Ontario, by Canada Night Hawk Mines, Ltd.

New uses for barium products, according to the United States Bureau of Mines, include the following—a new compound, barium aluminate, used for water purification, of which the manufacturing process is patented, is now produced on a commercial scale. Closely allied with this use is the adoption of air-floated natural barium carbonate to replace the more expensive barium chloride in the removal of calcium sulphate from salt brine. Neither of these barium compounds, however, can be used where the resultant product is for human consumption. Recently ground barite has been added direct to glass mixtures. The consumption of barite in the United States in 1932 was apportioned as follows:—for the manufacture of ground barite, 34,554 tons; for lithopone, 120,378 tons, and for barium chemicals, 32,629 tons.

The uses of barium metal have increased in the lamp, radio and spark plug field and this has, states "Mineral Industry" allowed production on a larger scale. In 1931 the price of the metal was \$30 to \$35 per pound while in 1932 it had dropped to \$7.50 to \$10, with prospects of still lower prices as the consumption grows.

"Metal and Mineral Markets" quotes barite prices for September, 1933, as follows: f.o.b. mines: California, crude, \$6 per ton. Georgia, barytes ore, crude, \$6.50 to \$7.00 per long ton. Missouri, per ton, water ground and floated, bleached, \$23, car lots, f.o.b. works. Crude ore, minimum 95 per cent BaSO₄, less than 1 per cent iron, \$5.00; 1 per cent iron and 93 per cent BaSO₄, \$5; low grade, \$4.50, f.o.b. mines.

Imports of barytes into Canada in 1932 totalled 25,834 cwt. valued at \$22,989 as compared with 33,726 cwt. worth \$32,712 in 1931. These came in 1932, in the order of their importance, from Germany, the United States and the United Kingdom. No exports of barytes were reported either in 1931 or 1932. Imports of lithopone during 1932 amounted to 16,110,700 pounds valued at \$585,148 as against 13,862,914 pounds at \$569,037 in 1931. The principal barytes producing countries are the United States, Germany, United Kingdom and Italy.

Table 241.—Production of Barytes in Canada, 1923-1932

(For the years 1885 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	409	8,548	1928.....	127	2,847
1924.....	150	3,308	1929.....	105	2,341
1925.....	91	2,259	1930.....	66	1,484
1926.....	105	2,307	1931.....	16	363
1927.....	56	1,268	1932.....		

Table 242.—Imports of Barytes and Barium Products into Canada, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Barium, peroxide of, non-alcoholic.....	3	1,141	3	624	2	461
Blanc fixe.....	1,055	52,591	798	34,483	466	20,932
Barytes.....	1,949	35,945	1,686	32,712	1,292	22,989
Lithopone.....	8,025	722,341	6,931	560,037	8,055	585,148
Satin white.....	829	19,579	576	13,819	304	8,170

BITUMINOUS SANDS

Shipments of bituminous sands from the Fort McMurray district, Alberta, amounted in 1932 to 343 tons valued at \$1,372 as compared with 1,015 tons worth \$4,060 in 1931 and 2,067 tons at \$8,268 in 1930. The 1932 shipments were from the Fort McMurray district and went to points in Saskatchewan, Alberta, Ontario and Quebec. These deposits of bituminous sands are stated to rank among the largest of their kind in the world.

The investigations of the utilization of this material follow three main channels: (1) The use in bituminous road construction, as investigated largely by the Department of Mines, Ottawa. (2) The use of separated bitumen as a source of gasoline, lubricants, etc., as investigated by the Research Council of Alberta and by the Department of Mines. (3) Its use for the production of certain of the higher priced classes of asphaltic materials. Some work in this latter field has been done by the National Research Council and it has been found that by oxidation under controlled conditions mineral rubber of various grades and of very desirable quality can be produced. These are of interest in the compounding of rubber products, the production of certain bituminous paints, and the manufacture of the higher grades of mastic-type floors, etc.

Commercial trials of some of the products obtained are now under way.

The widespread nature of these deposits affords support for the view that they will in due course be of considerable economic importance.

Table 243.—Production of Bituminous Sands in Canada and Imports of Asphalt, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Bituminous sands.....	2,067	8,268	1,015	4,060	343	1,372
IMPORTS—						
Asphalt, solid.....	42,791	650,837	36,900	517,532	12,532	193,912
Asphalt, not solid.....		98,458		35,854		10,709
Asphaltum oil for paving purposes.....		70,130		45,557		8,887
Total.....		819,425		598,943		213,508

FLUORSPAR

Production of fluorspar in Canada during 1932 amounted to 32 tons valued at \$464 as compared with an output of 40 tons worth \$620 in 1931. Production in both years came from the Madoc area, Hastings county, Ontario. Fluorspar also occurs at the Rock Candy mine situated north of Grand Forks, British Columbia; the mineral is occasionally mined at this property by the Consolidated Mining and Smelting Company for use in the metallurgical plants at Trail. The United States Bureau of Mines states that low activity in the industries using fluorspar in the United States is reflected in shipments of only 25,251 short tons of domestic fluorspar (the lowest since 1901) and imports of only 13,236 short tons (the lowest since 1921). Fluorspar shipped from United States mines was used in the United States as follows:—

Use	1931		1932	
	Short tons	\$	Short tons	\$
Steel.....	39,832	563,842	18,881	228,933
Foundry.....	1,123	18,075	524	7,636
Glass.....	5,272	162,292	3,596	101,765
Enamel and vitrolite.....	1,996	65,458	1,261	36,318
Hydrofluoric acid and derivatives.....	4,386	108,136	738	14,603
Miscellaneous.....	557	7,873	226	2,691
Total.....	53,173	925,676	25,226	391,946

Fluorspar prices in the United States, September, 1933, were: per net ton, 85 per cent CaF_2 and not over 5 per cent SiO_2 , Kentucky and Illinois mines; washed gravel, \$15; No. 2 lump, \$17. Ground fluorspar, f.o.b. Illinois mines, 95 to 98 per cent CaF_2 and not over $2\frac{1}{2}$ per cent SiO_2 , \$30 in bulk; \$34 in bags and barrels. F.o.b. Colorado, 82-5, \$10. Foreign fluorspar, gravel, 85-5, \$20.25 to \$20.75 per gross ton, duty paid, Baltimore and Philadelphia.

Imports of fluorspar into Canada during 1932 amounted to 2,018,000 pounds valued at \$22,965 as compared with 6,431,000 pounds worth \$31,257 in 1931. No exports of fluorspar from Canada were recorded wither 1931 or 1932. Hydrofluosilicic acid totalling 20,869 pounds and valued at \$1,901 was imported during 1932 as against 25,030 pounds at \$3,264 in 1931.

Table 244.—Production of Fluorspar in Canada, by Provinces, 1923-1932

(For the years 1905 to 1922 see Mineral Production of Canada, 1928)

	Ontario		British Columbia		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1923.....	64	597	75	1,135	139	1,732
1924.....	76	1,343			76	1,343
1925.....	12	200	3,874	19,034	3,886	19,234
1926-1928.....						
1929.....	70	1,120	17,800	267,000	17,870	268,120
1930.....	80	1,240			80	1,240
1931.....	40	620			40	620
1932.....	32	464			32	464

GRAPHITE

Canadian production of graphite in 1932 amounted to 346 short tons valued at \$18,483 as compared with an output of 548 tons worth \$32,149 in 1931; the mineral during both years was produced entirely in the province of Ontario. The general world industrial depression with a declining demand for graphite and resultant lower prices seriously affected mining operations in most of the graphite producing countries. Canada has produced both flake and amorphous graphite and in the Black Donald mine in Renfrew county, Ontario, the Dominion possesses one of the largest graphite deposits in the world. Important graphite properties have also been operated in the province of Quebec. Competition of more cheaply obtained graphite and the depressed trade conditions have resulted in the mine and mill of the Canadian Graphite Corporation at Guenette, near Mount Laurier, remaining idle since 1930; for five years previously this company had been the only graphite producer in Quebec.

Development work was conducted both in 1931 and 1932 on deposits of amorphous graphite located near Glendale, Inverness county, Nova Scotia; the mineral occurs in an impure crystalline limestone.

The following are the figures, in long tons, for shipments of graphite from Ceylon during 1932—Japan, 1,633; United States, 1,212; United Kingdom, 1,192; Germany, 687; Australia, 360; France, 325; British India, 260; Italy, 205; Belgium, 75; Denmark, 40; Burma, 26; Canada, 25; Hong Kong, 20; China, 15; Holland, 12; British South Africa, 6; Siam, 6; total, 6,099. The average value per ton was Rs. 167.73. The correspondent of the Mining Journal, London, states that the 1932 demand in Ceylon was principally for very high carbon plumbago and as Madagascar cannot produce this quality, Ceylon had the advantage of insisting on obtaining a reasonable price for the product; most of the Ceylon mines were worked under antiquated conditions.

A fusion in the German graphite industry has brought into existence the largest graphite company in Europe, according to the "Chemical Trade Journal and Chemical Engineer"; the absorbing concern is the Graphitwerk Kropfmühl A.G., of Munich, which is acquiring two similar companies in Bavaria as well as the plant of a larger concern, the Deutsche Graphitwerke G.m.b.H., at Dohna, near Dresden, owned by the Rutgerswerke A.G. The annual graphite production, it is estimated, will be increased by 10,000 tons to approximately 30,000 tons by this merger.

Graphite prices in the United States for September, 1933, were: per pound f.o.b. New York, Ceylon lump, 6½ to 7½ cents; carbon lump, 3 to 6 cents; chip, 5 to 6 cents; dust, 3 to 4 cents; Madagascar flake, 5 to 6 cents; No. 1 flake, 8 to 16 cents; No. 2, 5½ cents upwards; fine ground, 55 to 70 per cent carbon, 3 cents upward; amorphous, 3 cents upward; crude amorphous graphite, \$12 to \$23 per ton, according to grade. For an historical review of Canadian graphite mining see 1931 annual mineral report.

Table 245.—Production of Graphite in Canada, by Provinces, 1923-1932

(For production from 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1923.....	45	2,316	1,068	65,557	1,113	67,873
1924.....	46	3,275	1,288	72,842	1,334	76,117
1925.....	359	30,900	2,210	127,863	2,569	158,763
1926.....	326	29,516	2,401	165,344	2,727	194,860
1927.....	34	2,043	1,795	109,613	1,829	111,656
1928.....	50	4,668	1,047	52,373	1,097	57,041
1929.....	173	12,652	1,288	90,522	1,461	103,174
1930.....	197	9,850	1,338	86,542	1,535	96,392
1931.....			548	32,149	548	32,149
1932.....			346	18,483	346	18,483

Table 246.—Production in Canada, Imports and Exports of Graphite, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore milled.....	6,037		924		1,424	
Production.....	1,535	96,392	548	32,149	346	18,483
IMPORTS—						
Crucibles, plumbago.....		52,458		34,215		29,909
Plumbago, not ground or otherwise manufactured.....		2,032		1,404		1,869
Plumbago, ground and manufactures of, n.o.p.....		61,742		81,233		70,565
EXPORTS—						
Graphite or plumbago, crude or refined.....	2,418	127,291	951	44,606	907	41,146
Carbon and graphite electrodes.....		230,282		154,470		217,732

Table 247.—World Production of Graphite, 1930-1932

(Supplied by Imperial Institute)

(Long tons)

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Canada (sales).....	1,371	489	309	Italy.....	5,787	3,986	2,898
Australia.....		60	70	Norway.....		600	661
Ceylon (exports).....	8,724	6,721	6,100	Japan.....	226	280	487
Union of South Africa.....	206	43	49	Korea.....	19,672	13,000	(d) 16,320
India.....		7	5	Madagascar.....	10,200	4,613	2,691
Total.....	10,300	7,300	6,500	Morocco (French zone).....	1,800		236
FOREIGN COUNTRIES				Mexico.....	5,760	3,073	2,013
Austria.....	17,400	11,869	10,431	United States (sales) (b), amorphous.....	1,733	(a)	(a)
Brazil (exports).....	9	9		Norway.....		868	3,526
Czechoslovakia.....	14,330	1,801	907	Total (c).....	102,000	65,000	59,000
France.....	226		(a)	World's total (c).....	112,000	72,000	65,000
Germany.....	24,602	23,199	20,479				

(a) Information not available.

(b) Crystalline graphite is also produced in the United States, but figures are not available for publication. The sales in 1929 were 2,592 tons.

(c) Excluding production as per note (b), also U.S.S.R. (Russia), which is not available; during 1929 this was recorded as 4,500 tons.

(d) Exports.

LITHIUM MINERALS

Lithium-bearing minerals are reported to occur in commercial quantities at Lac du Bonnet in southeastern Manitoba. Shipments have been made from these deposits for experimental purposes. No production of lithium ores was recorded in Canada for 1932. At the present time the largest consumer of lithium minerals is the glass industry; lithium salts are used in medicine and the chloride in the manufacture of fireworks and signal lights.

Metallic lithium when alloyed with magnesium in the proportion of 3 parts to 7 lithium produces an alloy of specific gravity 1.4 and very light alloys of these two metals have recently been produced for aeronautical purposes. Recent research in Germany has resulted in the production of a series of beryllium lithium alloys which are stated to have industrial application. The specific gravity of these alloys ranges from 1 to 1.5 and they contain 26 to 65 per cent of lithium.

In the manufacture of porcelain the replacement of feldspar by lepidolite produces products with a fine appearance and extreme whiteness which possess notable resistance to thermal shocks. Lithium hydroxide, the most important commercial lithium compound, is used for prolonging the life of alkaline accumulators; the use of lithium nitride as a catalyst in the synthesis of ammonia has been patented. The compound results from the heating of lithium in an atmosphere of nitrogen.

Prices for lithium, December, 1932, were: metallic lithium, f.o.b. New York, 98 to 99 per cent, 100 pound lots, \$15 per pound. Lepidolite per ton \$50 to \$55 for ordinary grades, nominal.

MAGNESITIC DOLOMITE AND MAGNESITE

Production of calcined and dead-burned magnesitic dolomite in 1932 amounted in value to \$262,860 as compared with a value of \$295,579 in 1931 and \$336,162 in 1930. The production of this material is confined, in Canada, to the townships of Harrington and Grenville along the north shore of the Ottawa river, some sixty miles west of Montreal. The deposits are described as replacements in ancient crystalline limestone of the Grenville series. Deposits of hydro-magnesite occur near the town of Atlin, British Columbia.

The Quebec deposits continued to be the only commercial source of this type of product in Canada. Production was maintained surprisingly well in view of the depression in the steel industry, its chief market. New markets were also entered and the Canadian material is now finding increasing use as a basic refractory in non-ferrous metallurgical plants.

Increased manufacture and use of patching and ramming refractory materials based on magnesite or chromite is also to be noted in Canada.

What may be an occurrence of magnesite of considerable commercial significance was investigated during the year by the Geological Survey. It is situated near Cranbrook, B.C., and according to early reports is of considerable magnitude.

The United States Bureau of Mines reports that patents bearing on the utilization of dolomite have increased in number in recent years both in the United States and other countries. These patents describe the production of refractories, magnesian cements, magnesium chemicals, and metallic magnesium and indicate that dolomite, because of its widespread occurrence, must be considered an increasingly important competitor of magnesite.

The magnesite industry in Russia is being developed rapidly, Soviet figures for 1931 showing the following outputs in metric tons: crude magnesite, 246,000; caustic calcined magnesite, 14,000. The St. Minière de la Choumadiya holds a concession covering the important deposit of amorphous magnesite near Cacak, Yugoslavia. With indicated reserves ample to meet French requirements for several decades, the company has installed modern equipment intended

to furnish a substantial tonnage over a long period. During 1932 Greece exported 13,002 metric tons of crude magnesite, the distribution in per cent being as follows: Great Britain, 43; Italy, 35.5; Germany, 16; Netherlands, Belgium, Luxemburg and France, 5.5. The exports of calcined magnesite, amounting to 10,563 metric tons with an average value of 1,050 drachmas per ton, were distributed as follows: Netherlands, 35 per cent; France, 35 per cent; Germany, 15 per cent; Great Britain, 13 per cent.

The Austrian output of crude magnesite decreased from 179,440 metric tons in 1931 to 134,400 metric tons in 1932. At the same time the production of dead-burned and caustic calcined magnesite decreased 26 and 11 per cent, respectively. About one-half the Austrian output of caustic calcined magnesite is used within Austria, the exports (15,615 metric tons) going mainly to Germany, with significant quantities also to France and Czechoslovakia.

Imports of calcined magnesite (light and dead-burned) into Great Britain and Northern Ireland in August, 1933, were 1,392 tons worth £8,490. Greece supplied 528 tons; Canada, 333 tons; British India, 205 tons; Germany, 211 tons; Holland, 95 tons; and Norway, 20 tons.

Magnesite prices in the United States for September, 1933, were: per ton, f.o.b. California, dead-burned, \$25. Kiln run, 94 per cent MgO (artificial periclase), \$65. Caustic, 95 per cent MgO, \$38; 90 per cent, \$35. Washington, dead-burned grain magnesite, \$22.

Table 248.—Production of Magnesite* in Canada, 1923-1932

(For the years 1908 to 1922 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	4,801	134,382	1928.....	13,195	346,990
1924.....	3,873	101,356	1929.....	18,809	491,170
1925.....	5,576	122,325	1930.....	13,336	336,162
1926.....	4,571	137,431	1931.....	11,411	295,579
1927.....	7,337	230,309	1932.....	†	262,860

* Magnesitic dolomite.

† Owing to the limited number of firms, the data relating to quantity are not published.

Table 249.—Production in Canada, Imports and Exports of Magnesite*, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude, mined.....	27,638		26,839		3,123	
Crude, calcined or treated.....	28,128		22,544		17,883	
PRODUCTION—Calcined and dead-burned.....	13,336	336,162	11,411	295,579	(d)	262,860
IMPORTS—						
Magnesia pipe covering.....		297,513		126,210		64,924
† Magnesite.....	89	3,629				
Magnesite firebrick.....		270,180		152,435		71,077
(a) Magnesite, dead-burned, sintered caustic, calcined or plastic magnesite..	1,182	21,799	1,787	40,628	1,065	28,626
EXPORTS—						
* Magnesite, calcined or dead-burned.....	1,851	48,536	1,610	45,257	1,194	33,103

† January 1 to March 31, 1930; also in addition 260 tons of crude magnesite rock valued at \$5,187 were imported from April 1 to December 31, 1930.

(a) April 1 to December 31, 1930.

* Including magnesitic dolomite.

(d) Not available for publication.

Table 250.—World Production of Magnesite, 1930-1932

(Supplied by Imperial Institute)

(Long tons)

Country and description	1930	1931	1932	Country and description	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Union of South Africa—				Italy—			
Crude magnesite.....	1,879	1,336	1,396	Crude magnesite.....	4,057	3,415	(a)
Canada—				Yugoslavia (Serbia only)—			
Crude magnesite.....	24,677	23,963	(a)	Crude magnesite.....	17,701	22,700	(a)
Caustic and dead-burnt(c)	11,907	10,188	7,939	Calced magnesite.....	6,585	8,436	(a)
India—				Norway—			
Crude magnesite.....	16,523	5,333	13,864	Crude.....	2,171	1,555	1,290
Australia—				Calced magnesite (c).....	783	450	512
Crude magnesite.....	8,754	3,475	(e) 5,362	Magnesia bricks (c).....	326	290	537
Southern Rhodesia—				U.S.S.R. (Russia) —(years			
Crude.....			13	ended Sept. 30)—			
				Crude magnesite.....	150,000	242,000	(a)
FOREIGN COUNTRIES				Caustic magnes (c).....	6,129	13,665	(a)
Austria—				Dead-burned magnes (c)	62,566	51,700	(a)
Crude magnesite.....	299,588	176,606	132,277	Magnesia bricks (c).....	33,906	29,904	(a)
Caustic magnes (c).....	20,200	34,211	30,412	United States—			
Dead-burned magnes (c)	122,264	38,186	28,298	Crude magnesite.....	115,464	65,716	34,341
Bricks (c).....	40,434	23,441	15,283	Caustic (sales) (c).....	7,661	5,268	3,013
Czechoslovakia—				Dead-burned (sales) (c)..	44,161	25,206	13,246
Crude magnesite.....	116,000	(a)	(a)	Turkey—			
Calced magnesite (b)...	30,123	14,569	13,013	Crude magnesite.....	317	2,162	305
Greece—				China—			
Crude magnesite.....	67,427	49,200	70,000	Crude magnesite.....	29,016	32,173	31,071
Caustic magnes (c).....	19,661	12,764	(a)				
Dead-burned magnes (c)	889	1,886	(a)				

(a) Information not available.

(b) Exports less imports.

(c) Derived from crude shown, and not additional.

(e) Excluding production of Victoria, which is not available. During 1931 this amounted to 50 long tons.

MAGNESIUM SULPHATE

In 1915 work commenced on the spotted Lake deposit of magnesium sulphate near Kruger Mountain, Osoyoos division, British Columbia. Shipments were made of this material to the drug trade during 1915 and 1916. Crude magnesium sulphate to a total of 2,600 tons was extracted in 1917 of which quantity 929 tons were shipped to Oroville, Washington. The following year a deposit near Clinton, Lillooet district, was also operated. Preliminary shipments were made in 1920 from several lakes containing these salts, on the Basque ranch, near Ashcroft, British Columbia. No activities have been reported in this industry since 1923. In that year 121 tons of refined magnesium sulphate were shipped from a deposit near Ashcroft, British Columbia.

During some recent experimental flotation research work in Australia, it was noted that magnesium sulphate acted as an activator for marmatite. Subsequent experiments showed that it may be used in conjunction with copper sulphate and a suitable frothing agent such as eucalyptus oil to produce a concentrate of the above mentioned mineral, and thereby replace some of the more costly reagents now employed for this purpose. For small scale work magnesium sulphate in the proportion of about 1 pound per ton of flotation feed was used.

Imports into Canada during 1932 of magnesium sulphate or epsom salts totalled 4,383,115 pounds valued at \$47,679 as compared with 4,120,086 pounds at \$43,807 in 1931.

For annual productions from 1917 to 1923 see Mineral Production of Canada annual report for 1930.

MANGANESE, BOG

Bog manganese consists mainly of oxide of manganese and water, with some oxide of iron, and often silica, alumina and baryta. Shipments of bog manganese from Dawson Settlement, Albert county, New Brunswick, during 1931 amounted to 77 tons valued at \$462 and constituted the total Canadian production of this material for that year; the New Brunswick property was inactive throughout 1932 and no sales of bog manganese were reported anywhere in the Dominion. The material is utilized principally in the ceramic industry.

Imports into Canada of manganese oxide in 1932 amounted to 3,024,900 pounds valued at \$87,644 as compared with 53,106,000 pounds worth \$258,257 in 1931.

MINERAL WATERS

A record of all the natural mineral waters produced in Canada and sold to the general public for medicinal purposes since 1888 has been compiled. In that year 124,850 gallons were produced and during the following ten years production varied between 424,600 gallons and 767,460 gallons. Only the value of shipments were recorded from 1899 to 1920; the high mark for the industry was reached in 1911 when the production was valued at \$223,758.

Sales of natural mineral waters in Canada during 1932 amounted to 76,714 imperial gallons valued at \$7,170 as compared with an output of 217,408 imperial gallons worth \$13,324 in 1931 and 227,141 gallons at \$2,481 in 1930. Of the 1932 output, Quebec produced 15,506 gallons valued at \$4,697, the balance of the Canadian production coming entirely from the province of Ontario. Some of the more prominent Canadian natural mineral waters possessing special therapeutic or hygienic properties and associated with health resorts, include the following: Abenakis Springs on the St. Francois river, in Yamaska county, Quebec—these waters are saline and somewhat resemble those of Kissingen or Nauheim Spas in Germany; calcic, alkaline waters occur in the same province at Pottou Springs in Brome county. In Ontario, saline, sulphur and gas springs occur at Caledonia Springs; and at Carlsbad Springs, near Ottawa, the waters range from alkaline to strongly saline. St. Catharines, near Niagara Falls, is one of the oldest Canadian mineral water resorts; springs occurring here yield strongly saline, bromic and iodic waters, and resemble the celebrated waters of Kreuznach in Prussia; sulphur waters are also found in Ontario at the Preston mineral springs in Waterloo county. The most famous of all Canadian springs is undoubtedly the group of hot sulphur springs at Banff, Alberta; the waters here resemble those of the famous Hot Bath Spring in England. The Banff waters may be classified, according to the Mines Branch, Ottawa, as moderately mineralized, calcic, sulphated, saline (sulphuretted) waters; radioactive determinations show the Banff Springs to be among the most active in Canada. In British Columbia the Harrison Hot Springs in the Fraser Valley and the Halcyon Hot Springs on Arrow Lake are noted for their curative properties.

Table 251.—Production of Mineral Waters in Canada, 1923-1932

(For the years 1888 to 1922 see Mineral Production of Canada, 1928)

Year	Imp. gal.	Value	Year	Imp. gal.	Value
		\$			\$
1923.....	232,451	16,455	1928.....	269,045	33,498
1924.....	209,353	15,421	1929.....	321,905	16,139
1925.....	190,134	28,413	1930.....	227,141	24,481
1926.....	215,356	29,721	1931.....	217,408	13,324
1927.....	303,530	14,624	1932.....	76,714	7,170

Table 252.—Production in Canada, Imports and Exports of Mineral Waters, 1930-1932

	1930		1931		1932	
	Imp. gal.	Value	Imp. gal.	Value	Imp. gal.	Value
		\$		\$		\$
PRODUCTION, by provinces—						
Quebec.....	12,941	3,727	19,868	4,746	15,506	4,697
Ontario.....	214,200	20,754	197,540	8,578	61,208	2,473
Total.....	227,141	24,481	217,408	13,324	76,714	7,170
IMPORTS—Mineral and aerated waters.....		195,257		154,971		110,040
EXPORTS—Mineral and aerated waters.....		10,017		13,411		7,361

PHOSPHATE

The existence of the extensive Lièvre river deposits of crystalline phosphate lime or apatite was first noted in 1829. However, the first commercial shipments of this mineral in Canada were made between 1870 and 1877 from North Burgess township, Ontario, to a superphosphate plant at Brockville. An active market was open in Europe for raw phosphate for fertilizer purposes and this added impetus to the mining of phosphate in Ontario and Quebec. From

1878 to 1892 inclusive, the industry in Canada was at its highest point, and 296,695 tons were produced. Exports during this 15-year period totalled 281,329 tons of which quantity Great Britain received approximately 86 per cent; the United States, 8 per cent; Germany, 5 per cent; and France, Denmark, Spain and Holland, the remainder. The maximum shipment of 31,753 tons was made in 1890. Since 1899, however, the annual production has exceeded the 1,500 ton mark only once.

The discovery and opening up in the United States of the large phosphate deposits in Florida in the nineties and later of those in Tennessee, the western states and Africa, caused a sharp falling-off in prices for phosphate and resulted in the closing of the large Canadian mines.

The production of Canadian phosphate since 1895 has been mainly obtained as a by-product in the mining of mica. Activity in the phosphate industry in Canada has been practically negligible for a number of years.

Sales of phosphate in Canada during 1932 totalled 1,316 tons valued at \$12,333. This mineral in the form of apatite, a calcium phosphate, was produced entirely in the Buckingham district of the province of Quebec. The last recorded production of this mineral in Canada was in 1930 when 40 tons valued at \$760 were shipped from the same area. Phosphate produced in Quebec during 1932 was purchased by the Electric Reduction Company of Buckingham, P.Q. In addition to the sales reported in Quebec there was an output of apatite in 1932 from a property in North Burgess township, Lanark county, Ontario. The mineral mined here was shipped to the United States for experimental purposes. No work of importance was done in 1932 on the phosphate properties of the Consolidated Mining and Smelting Company in British Columbia. The study of the geological features of the phosphate-bearing section of this district and the nature of the deposit at various points was, however, continued.

While phosphate fertilizers and compounds are produced by three Canadian manufacturers, no Canadian rock is at present being used for this purpose. Recent developments in the blast furnace production of phosphoric acid, however, may be of eventual interest in the utilization of some of the lower grade Canadian resources of this material.

It is interesting to note that the production of apatite concentrates on the Kola Peninsula in Russia during 1932 was reported at 160,000 tons; for 1933 it is estimated that the total output of crude apatite will be 850,000 tons and of concentrates, 320,000 tons.

Utilization of phosphate rock in the United States during 1930 was as follows: (long tons) for direct application to the soil, ground rock, 41,593 tons; manufacture of phosphorous and chemicals containing phosphorous (other than super phosphates), 281,805 tons; ingredient for stock feed, 4,478 tons; fertilizer filler, 35,451 tons; miscellaneous uses, 2,214 tons, and for the manufacture of superphosphates, 2,367,787 tons (apparent consumption of phosphate rock, less tonnage of rock for all purposes other than the manufacture of superphosphates).

Consumption of phosphate rock in Canada for the manufacture of fertilizers during 1932 totalled 41,114 tons valued at \$316,518. Imports of phosphate rock during 1932 totalled 65,533 tons valued at \$346,907 as compared with 141,723 tons at \$619,079 in 1931.

Table 253.—Production of Phosphate in Canada, by Provinces, 1923-1932

(For the years 1870 to 1922 see Mineral Production of Canada 1928)

Year	Quebec		Ontario		Canada	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1923.....	30	600			30	600
1924.....						
1925.....	16	189			16	189
1926.....	40	800			40	800
1927.....	31	399	82	824	(a) 151	1,717
1928.....	91	1,126			(b) 641	8,276
1929.....	40	800			(c) 1,185	5,380
1930.....	40	760			40	760
1931.....						
1932.....	1,316	12,333			1,316	12,333

(a) Includes 38 tons valued at \$494 shipped from British Columbia deposits.

(b) Includes 550 tons valued at \$7,150 shipped from British Columbia deposits

(c) Includes 1,145 tons valued at \$4,580 shipped from British Columbia deposits.

Table 254.—Production in Canada, Imports and Exports of Phosphate, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	40	760			1,316	12,333
IMPORTS—						
Phosphate rock.....	47,206	297,522	141,722	619,079	65,533	346,907
Acid phosphate (not medicinal).....	1,263	179,996	1,278	188,884	1,387	226,136
Phosphorus and compounds, n.o.p.....	43	32,241	49	36,539	160	32,888
Superphosphate or acid phosphate of lime.....	127,891	1,393,862	98,048	936,357	60,699	532,799
EXPORTS—Phosphate rock.....						

Table 255.—World Production of Phosphate-Rock

(Supplied by Imperial Institute)

(Long tons)

Producing country	1930	1931	1932
BRITISH EMPIRE			
Seychelles (exports).....	15,725	4,655	13,989
Union of South Africa.....		1,876	1,164
Canada.....	36		1,175
India.....	303	109	121
Christmas Island.....	119,933	65,849	84,197
Australia.....	26	609	869
Nauru Island.....	271,255	245,160	418,185
Ocean Island.....	172,050	130,450	196,875
Total.....	579,000	449,000	717,000
FOREIGN COUNTRIES			
Belgium (c).....	39,742	48,325	36,000
Estonia.....	4,774	4,508	1,115
France.....	157,300	106,000	(a)
Poland.....	11,561	(a)	(a)
Spain.....	5,300	7,612	9,822
U.S.S.R. (Russia (estimated)).....	220,300	325,000	450,000
Algeria.....	833,314	555,976	560,288
Egypt.....	308,527	252,952	344,256
Madagascar.....	11,000	8,000	7,012
Morocco (French zone).....	2,065,534	925,769	988,162
Tunis.....	3,273,000	2,114,000	1,651,000
Netherlands West Indies (exports).....	86,115	79,650	63,390
United States.....	3,951,353	2,577,535	1,711,050
French Indo-China.....	29,800	12,668	400
China.....	8,000	8,000	8,000
Formosa.....	56	(a)	(a)
Japan.....	27,275	20,814	18,461
Netherlands East Indies.....	1,258	108	2,681
Philippine Islands.....	1,467	256	(a)
Angaur Island (exports).....	61,105	44,683	54,347
Makatea.....	226,000	137,000	118,745
New Caledonia.....			1,000
Total.....	11,300,000	7,200,000	6,100,000
World's Total.....	11,900,000	7,700,000	6,800,000

Roumania produced 900 cu. metres of phosphatic guano during 1930.

(a) Information not available.

(c) In addition phosphatic chalk was produced as follows:—

1930—98,200 long tons. 1931—36,425 long tons.

POTASH

Natural potash salts are not yet mined or recovered on an extensive commercial scale in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland county, N.S., and at Gautreau, Westmorland county, N.B. A search for beds of economic importance has been made and results so far obtained have been sufficiently promising to warrant future work. Potassium chloride so far opened up at Malagash occurs in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite. Small shipments of potash bearing salt have been made recently from the Malagash deposit; this salt was employed as a fertilizer.

Imports of kainite and other German potash salts into Canada during 1932 totalled 4,352 short tons valued at \$69,035 as compared with 2,265 tons worth \$47,603 in 1931; 14,662 tons of crude muriate of potash valued at \$477,397 were imported in 1932 as against 28,861 tons at \$974,602 in 1931; sulphate of potash imports in 1932 totalled 1,345 tons with a value of \$57,132; in 1931 the tonnage was 3,992 and the value, \$159,777.

Natro-Alunite.—Natro-alunite occurs at Easy Cove in the Kyuquot section, Quatsino mining division, British Columbia. Small shipments of this mineral have been made from the deposit; the property has been inactive since 1927 when an endeavour was made to develop a trade demand for this product, utilizing potash content as a fertilizer. For historical tables showing production from this deposit see annual report on Mineral Production of Canada for 1930.

Table 256.—World Production of Potash Minerals, 1930-1932

(Long tons) (Imperial Institute)

Country and description	Potash minerals			K ₂ O content or equivalent		
	1930	1931	1932	1930	1931	1932
BRITISH EMPIRE						
Palestine—						
Carnallite.....		40,000	100,000		(a)	(a)
India—						
Nitrate (estimated).....	4,600	7,000	9,000	2,200	3,400	4,300
Total (estimated).....				2,200	(a)	(a)
FOREIGN COUNTRIES						
France— (c)						
K ₂ O Equivalent Sylvinite, etc.—						
12-16%.....	214,301	114,872	102,213			
18-22%.....	649,360	447,697	388,361	498,373	363,544	316,155
30-40%.....	207,776	146,165	94,849			
50% and over.....	464,496	363,544	337,324			
Germany—						
Kainite, Sylvinite, etc.....	9,935,271	6,881,691	5,688,310	1,406,851	961,232	797,314
Carnallite, etc.....	1,838,053	1,042,548	625,896	176,259	99,390	60,278
Italy—						
Leucite.....	40,500	16,000	43,000	(a)	(a)	(a)
Alunite.....	812	974	700	80	100	70
Poland—						
Kainite.....	99,191	58,186	44,108	9,919	5,819	4,411
Sylvite.....	201,591	199,006	249,996	(a)	(a)	(a)
Spain—(b)						
Crude salts.....	281,912	84,470	99,776	28,192	27,672	(a)
Nitrified earth.....	900	1,100	738	(a)	(a)	(a)
United States—						
Crude salts.....	94,473	119,571	127,786	54,705	57,036	55,348
Korea—						
Alunite (impure).....	11,523	13,600	(a)	(a)	(a)	(a)
Egypt—						
Crude salts.....		1	8			(a)
Total.....				2,220,000	1,560,000	1,310,000
World's total.....				2,200,000	1,560,000	1,320,000

(a) Information not available.

(b) In addition, 600 cubic metres of alunite were produced in 1930.

(c) Crude salts mined were as follows:—

1930—3,085,654 long tons

1931—2,162,000 "

PYRITES

Census returns for 1871 record a production of 2,800 tons of pyrites in Canada, made up of 2,300 tons from Quebec deposits and 500 tons from Ontario. However, it is only since 1886 that a continuous official record of pyrites production is available. Customs' records for the period 1881 to 1885 inclusive, show exports of 120,126 tons of pyrites to the United States. The 1886 output of pyrites was 42,906 tons, all of which was obtained from the Albert and Crown mines, Sherbrooke county, Quebec. In 1889, the production totalled 72,225 tons; shipments ranged from 27,687 tons to 158,566 tons during the following 24 years. The war years, 1914-1918, brought about an increased demand for sulphuric acid and a consequent advance in the production of pyrites. Shipments during this period reached a grand total of 1.6 million tons of approximately 46 per cent of the total Canadian production from 1886 to 1927.

It has been the practice of the Bureau in past years to report export shipments of pyrites in terms of the sulphur content of the pyrites. In view of the fact that there is now an important production of sulphur in the form of sulphuric acid made from waste bessemer gases, it has been decided to modify the method of reporting production to show the total sulphur content of the pyrites shipped and in bessemer gases used in the manufacture of sulphuric acid.

The sulphur content of pyrites shipped and of waste bessemer bases used in the manufacture of sulphuric acid, amounted in 1932 to 53,172 tons valued at \$470,014 as compared with 50,107 tons valued at \$429,457 in 1931 and 37,730 tons at \$314,835 in 1930. Sulphur employed in the manufacture of sulphuric acid was recovered from salvaged smelter gases in Ontario and British Columbia. In the former province, Canadian Industries Limited, continued the operation of its acid plant at Copper Cliff using sulphur gases from the International Nickel Company's smelter, while in British Columbia the Consolidated Mining and Smelting Company of Canada, Limited, reported that its sulphuric acid plants worked very successfully during 1932; most of the sulphur dioxide gases from the zinc plant roasters were converted into sulphuric acid. Costs by the end of the year were much below estimates and the plants at Trail have demonstrated that they can easily exceed their rated capacities. Oleum up to 40 per cent, water white acid for batteries and milk testing, and any degree of sulphuric acid can now be made in Canada.

During 1932 pyrites concentrates were shipped in Quebec by the Consolidated Copper and Sulphur Company of Eustis from Boischatel township by Aldermac Mines Limited. The only other Canadian shipper of pyrites in 1932 was the Britannia Mining and Smelting Co. Ltd. of Britannia Beach, British Columbia. Concentrates produced by this company went to both Canadian and foreign plants.

In addition to the manufacture of sulphuric acid from smelter flue gas—now an important Canadian industry—increasing attention is being paid to the possible recovery of elemental sulphur from smelter gases and from the large potential supply of by-product pyrite from the flotation concentration of ores. The recovery of sulphur by distillation from pyrite, as carried on many years ago in Europe, was supplanted by the development of a large world production of natural sulphur. Recently, however, two plants are reported to have been placed in operation in Europe wherein elemental sulphur is recovered from furnace gases. This development is of considerable interest to Canada.

Some pyrite was consumed in Canada during the year in the recently developed flash roasting process for the production of sulphur dioxide as used in the manufacture of sulphite pulp.

The marketing agreement between the American exporters and the Silician Sulphur Consortium which had been in effect since 1923 was nullified by the dissolution of the Consortium on July 31, 1932. The Consortium stock of sulphur, amounting to 200,000 metric tons, was taken over by the Bank of Sicily, to avoid depressing the market. The United States Department of Mines states that notwithstanding the drastic curtailment in American production in 1932 the United States remained by far the largest sulphur producer in the world. Italy, with

a slightly increased production, was again the second largest producer, while Japan, the third largest producer, increased its output materially. Norway, a new producer, entered the market as a significant factor during the year. The Norwegian sulphur was extracted from pyrites. Increased production was noted in Chile and Netherland East Indies. It was recently announced that a company with the title "Sulphur Quarries Ltd." and with English capital, had been formed for the exploitation of certain rich sulphur deposits which have been discovered near Gaza, in Palestine.

Spain continued to be the most important producer of pyrites in the world, while more stable labour conditions in Norway permitted a return to nearly normal production in that country.

The price for domestic sulphur in the United States, September, 1933, was, f.o.b., long tons, Texas mines, \$18. Pyrites per long ton unit of sulphur, c.i.f. United States ports, guaranteed 48 per cent sulphur, Spanish 12 cents. Nominal.

Table 257.—Production of †Pyrites in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Pyrites	Sulphur content	Value	Year	Pyrites	Sulphur content	Value
	tons	tons	\$		tons	tons	\$
1923.....	28,591	11,073	113,020	1928.....	68,836	38,589	321,033
1924.....	23,552	9,742	95,620	1929.....		42,781	350,843
1925.....	15,605	7,587	58,899	1930.....		37,730	314,835
1926.....	17,845	8,975	63,899	1931.....		50,107	429,457
1927.....	50,863	25,229	198,388	1932.....		53,172	470,014

†Since 1928 includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making.

Table 258.—Production in Canada of Pyrites with Sulphur Content, including Sulphur Contained in Sulphuric Acid Made from Smelter Gases, 1931 and 1932

—	Pyrites*			Smelter gas		Total sulphur	
	Sales	Sulphur content		Sulphur content		Tons	Value
	Tons	Tons	Value	Tons	Value		
			\$		\$		\$
1931							
Quebec.....	29,149	14,586	108,617	6,508	65,080	14,586	108,617
Ontario.....				11,828	118,280	6,508	65,080
British Columbia.....	34,144	17,185	137,480			29,013	255,760
Canada.....	63,293	31,771	246,097	18,336	183,360	50,107	429,457
1932							
Quebec.....	36,249	17,954	133,838	3,332	33,320	17,954	133,838
Ontario.....				23,884	238,840	3,332	33,320
British Columbia.....	15,800	8,002	64,016			31,886	302,856
Canada.....	52,049	25,956	197,854	27,216	272,160	53,172	470,014
				1931		1932	
				Tons	\$	Tons	\$
IMPORTS—							
Brimstone or sulphur, crude or in roll or flour.....				124,192	2,281,654	104,995	2,023,085
EXPORTS—							
Sulphur contained in pyrites.....				26,613	139,814	17,455	89,568
Sulphuric acid.....				996	18,507	712	10,287

*Includes iron pyrites concentrates made from copper ores.

Table 259.—World Production of Pyrites (Including Cupreous Pyrites), 1930-1932
(Supplied by Imperial Institute)
(Long tons)

Country	Pyrites			Estimated sulphur content		
	1930	1931	1932	1930	1931	1932
BRITISH EMPIRE						
United Kingdom.....	5,497	1,979	992	(a)	(a)	(a)
Union of South Africa.....	3,547	3,708	3,382	(a)	(a)	(a)
Canada (c).....	47,852	56,512	46,464	24,766	28,367	23,175
Cyprus.....	257,028	193,845	159,858	128,514	96,923	80,636
India.....	23			(a)		
Australia.....		507	274		(a)	(a)
Southern Rhodesia.....			268			107
Total.....	314,000	257,000	211,000			
FOREIGN COUNTRIES						
Czechoslovakia.....	23,253	20,367	15,393	9,185	8,045	6,855
France.....	193,219	189,686	187,743	88,244	87,200	86,400
Germany.....	285,165	220,459	172,449	122,163	95,025	74,154
Greece.....	175,000	139,208	(a)	84,054	66,292	(a)
Hungary.....	1,052	(a)	(a)	(a)	(a)	(a)
Italy.....	705,942	635,560	508,796	309,838	295,662	234,000
Yugoslavia.....	49,550	29,064	15,481	(a)	(a)	(a)
Norway.....	719,407	354,266	715,538	318,965	157,544	313,951
Poland.....	10,872	3,534		4,700	1,500	
Portugal.....	393,902	282,671	234,116	190,000	130,000	110,000
Roumania.....	23,881	24,393	5,266	10,000	10,000	(a)
U.S.S.R. (Russia) — (years ended Sept. 30).....	237,900	(a)	(a)	(a)	(a)	(a)
Spain.....	3,362,507	2,552,965	2,091,761	1,450,000	1,240,000	1,200,000
Sweden.....	59,486	56,699	70,404	23,034	22,429	27,521
Algeria.....	16,367	21,467	21,318	7,362	9,600	9,600
United States (b).....	347,512	330,848	186,485	124,226	121,503	64,897
Japan.....	552,532	551,522	714,606	220,000	220,000	290,000
Total.....	7,200,000	(d) 5,400,000	(d) 5,100,000			
World's total.....	7,590,000	(d) 5,700,000	(d) 5,300,000			

(a) Information not available.
(b) Includes by-product pyrite from zinc operations in Wisconsin and New York, and pyrite and pyrrhotite concentrates from copper operations in Tennessee.
(c) Includes pyrite ore also concentrates made from copper ores.
(d) Excluding U.S.S.R. (Russia).

Table 260.—World Production of Sulphur, 1930-1932
(Supplied by Imperial Institute)
(Long tons)

Country and description	1930	1931	1932	Country and description	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom and Irish Free State—				Ecuador—			
Spent oxide (b).....	155,432	124,200	129,000	Sulphur rock.....	100	150	
New Zealand—				Spain—			
Sulphur, crude.....	3,031			Sulphur rock.....	99,295	64,284	52,423
Retorted sulphur.....	25			Refined sulphur (d).....	21,577	21,155	17,151
Southern Rhodesia—				Sulphur recovered from pyrites.....			4,500
Sulphur.....		100		United States—			
Canada—				Crude sulphur.....	2,558,981	2,128,930	890,440
Smelters gas (e).....	8,921	16,371	(a)	Sulphur ore.....	120	(a)	100
FOREIGN COUNTRIES				Slurry (f).....	2,500	2,500	2,500
Germany (h).....				Smelters gas (g).....	220,000	220,000	220,000
Greece.....				Chile—			
Sulphur rock.....	3,588	5,312	(a)	Sulphur.....	8,184	5,018	11,770
Refined sulphur (c).....	313	368	300	China—			
Italy.....				Sulphur.....	10,600	9,900	(a)
Sulphur ore.....	2,198,565	2,145,119	2,127,000	Formosa—			
Crude sulphur— (c).....				Sulphur.....	489	779	(a)
Fused.....	345,024	347,372	344,449	Japan—			
Ground.....	19,409	19,502	25,119	Sulphur rock.....	14,392	2,195	2,501
Norway—				Refined sulphur.....	61,375	60,528	83,185
Sulphur recovered from pyrites.....	3,193	8,403	60,000	Netherlands and East Indies—			
				Sulphur.....	5,516	1,788	7,517
				Turkey			
				Sulphur.....		73	25

(a) Information not available.
(b) Consumed by the sulphur acid industries.
(c) Derived from sulphur rock above.
(d) Derived partly from sulphur rock alone and partly from crude sulphur imported from America and Italy as follows:—
1930.....12,106 tons
1931.....8,121 tons
1932.....9,721 tons
(e) Estimated sulphur content of gas used in acid making.
(f) The result of the purification of manufactured fuel gases.
(g) Estimated sulphur content of gas driven off in the smelting of zinc and copper concentrates, drills used in acid making.
(h) A large quantity of refined sulphur is produced in Germany from the desulphurisation of gases.

SULPHURIC ACID

Production of sulphuric acid in Canada in 1932 totalled 136,846 tons, 66° Bé, as compared with 119,541 tons in 1931. Of this total about 57,390 tons valued at \$759,553 were intended for sale and 79,473 tons valued at \$151,651 were for use in the producers' own acid plants or associated works. Exports of sulphuric acid from Canada amounted to 712 tons worth \$10,287 as against 997 tons at \$18,507 in 1931; practically all of this acid was shipped to the United States. Imports were shown at 62 tons worth \$9,543 in 1932 compared with 80 tons at \$10,561 in 1931.

Seven sulphuric acid works were in operation in 1932. The works at Copper Cliff, Ontario, and at Trail, B.C., used smelter gases only; the other plants used 12,465 tons of pyrites and 9,091 tons of sulphur. Dominion Steel & Coal Corp. at Sydney, N.S., manufactured sulphuric acid for use in their own steel mills and for making ammonium sulphate from coke-oven liquor; Canadian Industries Limited at New Westminster produced acid for use in the manufacture of superphosphate in their fertilizer plant at that point; and the Consolidated Mining and Smelting Company at Trail manufactured primarily for their own use in making triple superphosphate for fertilizer purposes but also produced acid for sale. The other plants were engaged chiefly in manufacturing acid for sale.

Table 261.—Production, Imports, Exports and Apparent Consumption of Sulphuric Acid in Canada, 1923-1932

Years	Production	Imports	Exports	Apparent consumption*
1923.....	174,300,512	582,400	24,406,400	150,476,512
1924.....	143,981,962	93,621	15,355,700	128,719,883
1925.....	166,791,926	103,340	38,358,600	128,536,666
1926.....	216,459,150	106,967	56,273,100	160,293,017
1927.....	196,940,218	105,546	34,814,200	162,231,564
1928.....	192,454,951	109,374	26,658,600	165,905,725
1929.....	221,497,046	222,075	16,793,800	204,925,321
1930.....	214,704,034	299,579	1,141,800	213,861,813
1931.....	239,081,443	159,601	1,993,300	237,247,744
1932.....	273,691,616	124,931	1,424,600	272,391,947

*No allowance made for changes in stocks on hand.

SILICA BRICK

Production of silica brick in Canada during 1932 totalled 93 thousand valued at \$4,304 as compared with a production of 900 thousand worth \$35,746 in 1931. The output in 1932 came entirely from the plants of the Algoma Steel Corporation at Sault Ste. Marie, Ontario. Silica brick is also produced at Sydney, Nova Scotia, by the Dominion Steel and Coal Company; silica rock for this production is quarried at Leitches Creek. Imports of silica firebrick, containing not less than 90 per cent silica, amounted in value to \$122,952 in 1932 as compared with a value of \$234,909 in the preceding year.

SODIUM CARBONATE (NATURAL)

Sales of natural sodium carbonate in Canada during 1932 totalled 495 tons valued at \$5,450 as compared with 712 tons worth \$7,351 in 1931 and 364 tons at \$4,550 in 1930. Several lacustrine deposits of sodium carbonate occur in British Columbia and in 1932 the total Canadian production came from the Salso property near Cherry Creek, Kamloops, and from a deposit operated in the Lillooet district by the Soda Mining and Products Co. Ltd. Sodium carbonate, or soda ash, has many uses, being employed in the manufacture of glass, soap, and in the purification of oils, etc. Artificial sodium carbonate is produced from sodium chloride (salt) by the Solvay or ammonia soda process and also by electrolytic methods.

Imports of soda ash or barilla in 1932 amounted to 1,803,951 pounds valued at \$27,751 as compared with 1,647,304 pounds valued at \$25,771 in 1931. Soda bicarbonate imports during 1932 totalled 10,592,208 pounds valued at \$196,841 as against 10,931,335 pounds worth \$188,268 in 1931.

Table 262.—Production of Natural Sodium Carbonate in Canada, 1923-1932

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	265	3,975	1928.....	519	4,922
1924.....	510	5,173	1929.....	600	8,100
1925.....	1,120	8,140	1930.....	364	4,550
1926.....	595	5,370	1931.....	712	7,351
1927.....	805	9,995	1932.....	495	5,450

SODIUM SULPHATE (NATURAL)

Sodium sulphate occurs naturally in large deposits in Western Canada. During 1932 all shipments were made from properties located in the province of Saskatchewan. The material in 1932 was marketed in both the United States and Canada, the greater part going to pulp mills. In 1931 sodium sulphate recovered at Ormiston, Saskatchewan, was consigned to Copper Cliff, Ontario, for use in the metallurgical treatment of copper-nickel ores. The International Nickel Company of Canada reported that in view of the decreased demand for nickel there was sufficient nitre cake in stock in 1932 to meet the requirements of the Orford process plant. It was therefore not necessary to resume the mining of sodium sulphate by the Horseshoe Lake Mining Co. Ltd., at Ormiston, or the production of nitre cake by Canadian Industries Limited at Copper Cliff; it was expected, by Canadian Industries Limited, that the nitre cake plant would be re-opened during the latter half of 1933. The value of shipments during 1932 amounted to \$271,736 as compared with a value of \$421,097 in 1931 or a decrease of 35.5 per cent. There was, however, a distinct increase in the value of sales during the early part of 1933 when the value of production for the first half of the year represented an increase of 20 per cent over that for the corresponding period in 1932.

Sodium sulphate finds its principal use in the pulp and paper industry for the manufacture of "kraft paper" by the sulphate process, in the manufacture of glass, in the dyes industry, in the smelting of nickel-copper ores, and as one of the raw materials in the manufacture of sodium carbonate. Consumption of salt cake for the manufacture of wood pulp in Canada during 1932 totalled 24,301 tons valued at \$489,343; 24,756 tons valued at \$503,560 in 1931, and 33,119 tons worth \$676,597 in 1930.

"Chemical and Metallurgical Engineering" reports that with the completion, late in 1932, of the new plant of the Rhodes Alkali & Chemical Corporation, the United States has moved one step nearer to complete independence of foreign salt cake. Rhodes Marsh, the site of the new plant, is south of Mina, Nevada; salts occurring in the deposit include Glauber's salt, thenardite (anhydrous sodium sulphate) and ordinary salt (Na Cl).

Imports of salt cake (crude) into the United States in 1932 totalled 122,247,237 pounds valued at \$644,074; of these imports Belgium supplied 32,311,109 pounds; Germany, 64,108,946 pounds; Netherlands, 7,156,138 pounds; Spain, 2,710,624 pounds; and Canada, 15,960,420 pounds.

Exports of sodium sulphate (Glauber's salt) from Belgium in 1932 included 41,190,820 pounds to the United States; 18,386,280 pounds to Finland, and 30,709,140 pounds to Sweden.

The following exports of sodium sulphate (including acid sodium sulphate) were made from Germany during 1932 to

	Pounds
Belgium.....	33,950,840
Bulgaria.....	1,058,860
Denmark.....	3,512,520
Finland.....	43,810,580
France.....	546,920
Great Britain.....	3,743,080
Italy.....	5,055,600
Latvia.....	1,008,040
Netherlands.....	10,218,120
Norway.....	11,986,040
Austria.....	2,250,820
Sweden.....	133,113,420
Switzerland.....	4,154,040
Czechoslovakia.....	6,326,980
British India.....	779,680
United States.....	76,175,660
Canada.....	2,910,380
Argentine.....	251,460
Brazil.....	2,842,840
Panama.....	4,310,900
Australia.....	1,809,720

Prices in the United States in October, 1933, for Glauber's salt were: domestic, car lots, works, bulk, ton \$15.00; bags, 100 pounds \$1.00; barrels, 100 lbs. \$1.10. Imported, bags, 100 pounds, \$0.75 to \$1.10. Sulphate, anhydrous, domestic, barrels, 2 cents per pound; imported, barrels, 100 pounds, \$1.85.

Table 263.—Production of Natural Sodium Sulphate in Canada, 1923-1932

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	733	10,189	1928.....	6,016	68,804
1924.....	1,083	6,004	1929.....	5,018	64,112
1925.....	3,876	19,380	1930.....		293,847
1926.....	6,775	13,550	1931.....		421,097
1927.....	5,659	11,319	1932.....		271,736

Table 264.—Production in Canada and Imports of Sodium Sulphate, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Natural Sodium Sulphate—						
Crude.....		293,847		421,097		271,736
IMPORTS—						
Soda, bisulphate of, or nitre cake.....	15,275	219,173	14,258	175,648	824	16,432
Soda, sulphate of, crude, known as salt cake.....	24,553	395,236	8,660	97,215	4,433	51,925
Glauber's salt.....	747	9,664	999	10,838	903	11,027
Soda ash or barilla.....	1,520	45,310	823	25,771	902	27,751

CHAPTER NINE

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, Slate and Stone.

Increases in Canadian population, national development and general industry during the years immediately preceding the commencement of the world economic crisis in 1929 were distinctly reflected by expansion in production of clay products and other structural materials. Economic factors, international in scope, and restrictive in nature, as existing since 1929, have unfortunately resulted in almost continuous recessions in the outputs of these particular materials. During the twenty-two years from 1907 to 1929 the valuation of these commodities increased from \$12,863,049 to \$58,534,834. In 1930 the value had fallen to \$53,727,465, in 1931 to \$44,158,295 and in 1932 to \$22,398,283. Domestic clay products production in 1932 was evaluated at \$3,650,218 as compared with \$7,841,288 in 1931; cement output totalled 4,498,721 barrels worth \$6,930,721 as against 10,161,658 barrels at \$15,826,243 in 1931; shipments of lime in 1932 amounted to 320,650 tons valued at \$2,394,537, in 1931 the tonnage was 344,785 and the value \$2,764,415; sand and gravel sales in 1932 totalled 14,469,942 tons worth \$4,480,596 as in contrast with 21,748,586 tons at \$6,651,165 in 1931; stone production in 1932 at 4,690,922 tons and \$4,938,461 represents a pronounced decline from the output of 8,397,860 tons at \$11,070,184 for the previous year.

Contracts awarded for building and construction in Canada in 1912 as reported by MacLean Building Review were valued at \$463,083,000. In 1913 contracts awarded totalled \$384,157,000 and in the following year a decrease to \$241,952,000 was recorded. During the war period (1915-1918) construction was largely neglected and the value of building awards remained below the one hundred million dollar mark. A revival of building set in after the war and in each year since 1920, with the exception of 1932, the volume of building has been well above the two hundred million dollar mark.

The value of all contracts awarded during 1932, as compiled by the MacLean Building Reports, Ltd., totalled \$132,872,400 as compared with \$315,482,000 in 1931, \$456,999,600 in 1930, and \$576,651,800 in 1929. These figures reveal the severe contraction in general construction activities during recent years and when compared with data relating to production of non-metallic minerals emphasize the intimate relationship existing between the construction and structural materials industries.

Table 265.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1930-1932

Province	1930	1931	1932
	\$	\$	\$
Nova Scotia.....	1,239,306	970,933	432,075
New Brunswick.....	624,012	630,542	779,492
Quebec.....	17,966,698	18,104,022	8,062,951
Ontario.....	21,812,563	15,225,817	8,827,968
Manitoba.....	4,284,457	2,534,749	1,259,733
Saskatchewan.....	1,101,062	562,964	176,681
Alberta.....	2,646,327	2,185,839	1,039,093
British Columbia.....	4,053,040	3,943,429	1,820,290
Canada.....	53,727,465	44,158,295	22,398,283

Table 266.—Production, Imports, Exports and Apparent Consumption of Clay Products and Other Structural Materials in Canada, 1930-1932

Item		Production	Imports	Exports	Apparent consumption
		\$	\$	\$	\$
Cement, Portland.....	1930	17,713,067	†604,520	212,071	18,105,516
	1931	15,826,243	†156,734	124,267	15,858,710
	1932	6,930,721	†64,975	38,921	6,956,775
Clay and clay products.....	1930	10,593,578	10,196,681	449,120	20,341,139
	1931	7,841,288	7,628,858	418,528	15,051,618
	1932	3,650,218	5,405,750	196,494	8,859,474
Lime.....	1930	4,038,698	28,107	444,728	4,022,077
	1931	2,764,415	10,561	283,459	2,491,517
	1932	2,394,537	6,241	188,329	2,212,449
*Sand and gravel.....	1930	8,344,913	520,438	465,292	8,396,971
	1931	6,651,165	375,126	146,060	6,880,231
	1932	4,480,596	211,546	33,620	4,658,522
Slate.....	1930	3,000	205,978	.....	208,978
	1931	5,000	155,008	.....	160,008
	1932	3,750	57,931	.....	61,681
Stone.....	1930	13,034,209	1,740,508	277,258	14,497,509
	1931	11,070,184	990,205	192,365	11,868,024
	1932	4,938,461	328,521	124,807	5,142,175
Total.....	1930	53,727,465	13,296,232	1,848,469	65,572,190
	1931	44,158,295	9,316,492	1,164,679	52,310,108
	1932	22,398,283	6,074,964	582,171	27,891,076

*Sand and gravel imports include silica sand for glass and carborundum manufacture and for use in steel plants. This was valued at \$352,796 in 1930, \$235,191 in 1931, and \$162,869 in 1932.

†Includes cement manufactures.

CEMENT

Shipments from Canadian cement plants during 1932 totalled 4,498,721 barrels valued at \$6,930,721 as compared with 10,161,658 barrels worth \$15,826,243 in 1931.

Cement was produced in 1932 at plants located in Quebec, Ontario, Manitoba, Alberta and British Columbia. Quebec mills produced 49·1 per cent of the total Canadian shipments, Ontario 35·6 per cent, Manitoba 5·4 per cent, Alberta 4·3 per cent, and British Columbia, 5·6 per cent.

Imports of Portland cement into Canada during 1932 amounted to 21,350 barrels (estimated at 350 pounds each) averaging \$2.72 per barrel as against 38,392 barrels averaging \$3.74 in 1931. Exports of Portland cement were recorded at 53,333 barrels valued at \$38,921 as compared with 114,064 barrels valued at \$124,267 in 1931. Cement made available for consumption in Canada amounted to 4,466,738 barrels in 1932.

The selling prices in 1932, f.o.b. Canadian works, were: high, \$2.55 per barrel and low \$1.25 per barrel.

In 1932 the Canadian cement industry consumed for all purposes 120,296 short tons of Canadian bituminous coal valued at \$652,734 and 90,718 short tons of imported coal at \$440,546; gasoline consumption totalled 87,050 gallons valued at \$15,856 and 7,386 gallons of fuel and diesel oil worth \$960 were also used. Electricity purchased totalled 85,630,342 k.w.h. valued at \$590,891. Electric motors with a total power rating 75,493 h.p. were operated on purchased power. Canadian cement plants operated 41 rotary kilns in 1932, possessing a total daily capacity of 43,622 barrels. The industry consumed 1,141,376 tons of limestone and 27,537 tons of gypsum. Six cement plants operating in Canada during 1932 employed the wet process while five used the dry, one plant manufactured cement from purchased clinker. The total apparent consumption of cement in Canada declined approximately 55 per cent from 1931; this followed very closely the fall in building permits. Some of the Canadian cement plants operated during the year at less than 30 per cent of their capacity.

Considerable interest has been recently taken in the utilization of cement in the manufacture of centrifugally spun reinforced concrete sewer pipe. These are made in machined metal moulds which are poured while revolving on spinning machines. It is stated that the concrete is sufficiently hard immediately after spinning to resist any ordinary pressures; other advantages claimed are that the pipes are impervious to moisture and unaffected by extreme climatic changes, and have a proportionally greater resistance to acids and soil alkalies. The interior of this type of pipe approaches a glazed surface in smoothness.

More recent developments in concrete construction reveal the increasing consumption of light weight aggregate. This type of material includes such trade products as "haydite," "cell concrete" and "aerocrete." These cellular concrete products are produced either mechanically or by the chemical aeration of the mix. The recent development of the mixed-in-transit system of concrete service is proving, for certain types of construction, to possess very distinct advantages over the older system of mixing on the job.

A new Canadian-designed machine for producing multiple concrete conduits is now on the market. This is capable of manufacturing conduits for high tension cables in 8 duct, 6 duct, 4 duct, 3 duct, and 2 duct sections in three foot lengths and for low tension telephone cables in 6 duct, 4 duct, 3 duct and 2 duct sections also in three foot lengths.

It is noteworthy that cement enamel was selected as an interior finish for the North American Life Assurance Building recently completed in Toronto; cement enamel is a surface application of Portland cement combined with various chemicals, with or without the addition of colour which, when it hardens, produces a vitreous enamel-like finish that is reported to be practically indestructible, securely bonded, sanitary, washable and non-fading. By proper combination of texture and colouring a wide range of effects is easily attainable.

For the history of the Canadian cement industries see the 1930 annual mineral production report.

Table 267.—Capital Employed in the Cement Industry in Canada, 1931 and 1932

	1931	1932
	\$	\$
1. Capital employed as represented by:		
(a) Cost of lands, buildings, plant, machinery and tools (estimated value if rented).....	50,132,019	49,881,915
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	1,189,710	1,446,538
(c) Inventory value of finished products on hand.....	2,005,235	1,440,291
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,051,472	2,526,070
Total.....	57,378,436	55,294,814

Table 268.—Employees, Salaries and Wages in the Cement Industry in Canada, 1931 and 1932

Class	1931		1932	
	Number of employees	Salaries and wages	Number of employees	Salaries and wages
SALARIED EMPLOYEES.....	121	\$ 268,434	103	\$ 213,891
WAGE-EARNERS.....	1,699	2,164,516	1,113	1,130,881
Total.....	1,820	2,432,950	1,216	1,344,772

Table 269.—Production of Cement in Canada, 1923-1932

(For the years 1887 to 1922 see Mineral Production of Canada, 1928)

Year	Barrels	Value	Year	Barrels	Value
		\$			\$
1923.....	7,543,589	15,064,661	1928.....	11,023,928	16,739,163
1924.....	7,498,624	13,398,411	1929.....	12,284,081	19,337,235
1925.....	8,116,597	14,046,704	1930.....	11,032,538	17,713,067
1926.....	8,707,021	13,013,283	1931.....	10,161,658	15,826,243
1927.....	10,065,865	14,391,937	1932.....	4,498,721	6,930,721

Table 270.—Output, Sales, Imports, Exports and Consumption of Cement in Canada, 1930-1932

	1930		1931		1932	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
OUTPUT.....	11,790,408		10,197,964		4,643,675	
SOLD OR USED.....	11,032,538	17,713,067	10,161,658	15,826,243	4,498,721	6,930,721
STOCKS DEC. 31.....	2,246,621		2,286,927		2,431,881	
IMPORTS—						
Portland cement.....	143,436	569,848	38,392	143,491	21,350	58,092
Manufactures.....		34,672		13,243		6,883
EXPORTS PORTLAND CEMENT.....	198,736	212,071	114,064	124,267	53,333	38,921
APPARENT CONSUMPTION.....	10,977,238		10,085,986		4,466,738	

1 brl.=350 pounds.

Table 271.—Production of Cement in Canada, by Provinces, 1930-1932

Province	1930		1931		1932	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	4,865,609	7,031,528	4,942,323	7,092,895	2,210,584	3,155,702
Ontario.....	3,942,690	5,779,404	3,470,056	5,006,826	1,599,342	2,288,975
Manitoba.....	977,906	2,268,742	544,160	1,267,893	242,112	549,594
Alberta.....	525,289	1,144,160	626,483	1,286,080	193,571	399,922
British Columbia.....	721,044	1,489,233	578,636	1,172,549	253,112	536,528
Canada.....	11,032,538	17,713,067	10,161,658	15,826,243	4,498,721	6,930,721

CLAY AND CLAY PRODUCTS

The Clay and Clay Products Industry in Canada is classified into two divisions: (1) production from domestic clays, which includes the production of refractories, building brick, structural tile, floor tile, roofing tile, drain tile, sewer pipe and pottery, and (2) production from imported clays, which includes the manufacture of porcelain insulators, refractories, earthenware, pottery and ceramic floor and wall tile.

There were 180 plants representing a total capital investment of \$29,555,349 operating in the domestic and imported clay products industries in Canada during 1932. These two industries provided employment for 2,455 persons during the year; their earnings totalled \$2,283,855. The combined production in 1932 was valued at \$5,240,629 as compared with \$10,297,026 in 1931.

The existence of abnormal conditions in construction and general industry continued to adversely affect the Canadian clay industries throughout the period under review.

1. Production from Domestic Clays

The value of clay and clay products sold by Canadian producers during 1932 declined 53 per cent below that for the preceding year and 65 per cent below 1930. Sales in 1932 reached a total value of \$3,650,218 as against \$7,841,288 in 1931. Declines were registered in the value of all clay products with the exception of roofing tile, which showed a considerable increase in quantity and value over the previous year. Of the value of the total domestic clay products production, Ontario produced 45 per cent; Quebec, 29 per cent; Alberta, 9 per cent; and the other provinces in the order of their output value, were: British Columbia, Nova Scotia, Saskatchewan, New Brunswick and Manitoba.

Capital employed in the 164 plants making clay products from domestic clays during 1932 was reported at \$25,347,582. Salaries and wages paid to 1,740 employees amounted to \$1,576,586. Fuel consumed during the year consisted of 14,834 tons of Canadian coal, 51,582 tons of imported coal, 15,764 cords of wood, 178,650 thousand cubic feet of natural gas, and minor quantities of coke, fuel oil, gasoline and kerosene. The total cost of this fuel was \$579,803. Electricity purchased by the operating companies totalled \$106,783.

Plants for the production of brick and tile were in operation during 1932 in every province in Canada except Prince Edward Island. Throughout the Dominion there were 164 plants engaged in the manufacture of various kinds of brick, sewer pipe, structural tile, drain tile, and other clay products from Canadian clays or shales. Seven firms produced coarse earthenware, stoneware and other pottery from domestic clays during the year; shipments of these commodities were valued at \$244,861. Products classified as other and amounting to \$19,932 included such commodities as haydite, blue clay, plastic refractories, crushed brick, and modelling clay.

Fireclay blocks and shapes and fireclay were produced during 1932 in Nova Scotia, New Brunswick, Saskatchewan and British Columbia. Sales of these products reached a total of \$87,035; firebrick was manufactured in Saskatchewan, Alberta and British Columbia in 1932, sales of these amounting to \$71,757 in value as compared with \$107,597 in 1931.

Ceramic bodies for electrical heating devices have been developed in the ceramic laboratories of the Department of Mines, Ottawa, which, tests indicate, are far superior in resistance to thermal shock to any ware now on the market. As an outcome of investigations on the colour control of brick, certain plants in the Maritime Provinces are now producing face brick on a commercial scale. This production, it is reported, will probably lead to the complete displacement of imported brick into the Maritime markets. Tests also conducted by the Department on china clay and silica sand from holdings on the Missinaibi River in Northern Ontario, indicate that these materials are of economic importance.

C. H. Vivian states in "Clay Products News and Ceramic Record" that one of the more recent commercial applications of vacuum is in the removal of air from stiff mud clays prior to forming these into brick, tile and other products. Although the process is still in its infancy, it has already been employed by two potteries in the making of the more delicate ceramic products such as whiteware. . . . The extraction of air from clays increases the weight of the finished article from 3 to 6 per cent; while this is of no especial value in most products, it means greater compactness . . . evacuation of air improves the appearance of the product. The increase in plasticity results in smoother surfaces and sharper edges, tears and deformations are less frequent and blistering seems to be eliminated. The increases in strength in the plastic stage are quite remarkable.

"Contract and Engineering Review" reports that possibly the newest innovation of the year in water treatment was the introduction of bleaching clay, sometimes known as fullers' earth. . . . This clay can be used jointly with alumina sulphate and aids floc formation and it does not impart to water any chemical characteristics that might be disagreeable, and it has great advantages in water treatment due to its low cost. An article on coloured brick, appearing in the same publication, states that even with the many colours in brick and the interesting and novel textures now being produced, there is demand for still a wider range. Within the last few years many large buildings, especially in the United States, have been constructed with a glazed brick and demand for this type is very likely to develop in Canada.

At the Brick Manufacturers convention in Washington, D.C., it was emphasized that reinforced brick masonry is regarded as the greatest recent development in the clay products industry and promises a real revival in the use of brick. An unusual point in distribution was made by Mr. Stoddard, Secretary-Manager of the Brick Manufacturers' Association of America (associated with the Brick Manufacturers' Association of Canada) in his suggestion that brick manufacturers sell mortar, mortar colours and waterproofing.

As the result of recent work undertaken in the United States to compare the efficiency of fullers' earth and activated carbon for bleaching packing house by-product fats and greases, it was disclosed that the physical condition of the earth employed had much to do with the efficiency of bleaching. It has been found that fullers' earth or clays of essentially the same

chemical composition may act radically differently in bleaching efficiency. Fullers' earth from different locations has different absorptive powers and it seems to be the consensus of opinion among oil experts that English earth is a trifle better than the varieties in the United States.

According to the United States Vice Consul at Berlin, synthetic china clay has been produced at Goettingen by an absorption union between clay and silicic acid.

It is interesting to note that the exterior of the recently developed steel dwelling as erected at the "Century of Progress Fair" at Chicago is covered with slabs $1\frac{3}{4}$ inches thick, 2 feet wide, and 2 to 8 feet long. This material consists of a layer of tough, light weight haydite covered with thin-gauge steel, which has on its exterior surface a weather resisting coat of porcelain enamel.

The Brick Manufacturers' Association, with headquarters at 1305 Metropolitan Building, Toronto, Ontario, was organized in 1932. This association is entirely a service organization intended to give constructive information to architects, engineers, builders, contractors and others interested in brick construction. It will seek to promote the use of brick as a building material and endeavour to develop new fields for its utilization.

Clays.—The Ontario Department of Mines in a recent report on the ceramic industry of Ontario supplies the following information regarding clays: Clays are roughly classed as kaolins, ball clays, fireclays, stoneware clays, common clays and shale, depending upon their purity and physical condition.

Kaolin, often called China clay, is used in the manufacture of white tableware, porcelain, sanitary goods, floor tile, wall tile, etc. In the paper mills it is used as a filler for the best grades of white paper and for wall paper. Kaolin is a refractory and will soften at about cone 34 or 1760 deg. C. (3200 deg. F.).

Ball Clay.—Almost all white porcelain and pottery bodies contain kaolin, feldspar, ground silica and ball clay. The ball clay is not as pure as kaolin but is more plastic and adds to the strength of the product. Ball clay will soften at about 32 to 33 or 1700 deg. to 1745 deg. C.

Fireclay.—Clays of this type are usually still more impure, burning to a buff instead of a white; the classification proposed by the American Society for testing materials for clay fire-brick is as follows:—

No. 1 Heavy heat duty.....	Minimum cone 31 — 1680 deg. C.
No. 2 Intermediate heat duty.....	" 28 — 1615 deg. C.
No. 3 Moderate heat duty.....	" 26 — 1595 deg. C.
No. 4 Low heat duty.....	" 19 — 1515 deg. C.

Stoneware Clays.—These overlap with the fireclays in refractoriness and may extend to a somewhat lower temperature. They must be of good plasticity, smooth and fine grained in texture, of good tensile strength in the unburned state and must vitrify without excessive burning shrinkage.

Sewer-pipe Clay.—This clay is not a separate type but is usually a subdivision under fire-clay, stoneware clay or shale. It should burn to a vitrified body or at least to a very low porosity with a reasonable firing shrinkage and should allow salt glazing.

Paving Brick Clay.—This is not a separate type; paving brick are usually made from red burning shales which are low in lime, have a long vitrification range and a vitrified tough body.

Potters Clay.—This is not a separate type. Almost any clay that will work well in moulding and drying can be made into some type of pottery. When an opaque glaze is used, the colour to which the clay burns is often not essential.

Common or Brick Clays.—These are usually soft young surface clays, being very impure and having low refractoriness. The softening point is seldom above cone 7, 1210 deg. C. Such clays, which may be manufactured into soft mud or stiff mud brick with satisfactory burned properties, are used for both common and face purposes.

Shale.—Shales are older clays, often of the same purity and refractoriness as common surface clays; some, however, may be more refractory. Owing usually to their hardness they have little plasticity as compared to clays. Fine grinding and mixing with softer surface material allows them to be worked. They make excellent face brick.

NOTE.—For information relating to distribution of Canadian clays, history of the industry, etc., consult annual report on the Mineral Production of Canada, 1930.

Table 272.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1931 and 1932

Industry and province	1931					1932				
	Capital employed as represented by					Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills, and accounts receivable, etc.	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills, and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
By INDUSTRIES—										
<i>*Brick and Tile—</i>										
N. Scotia...	797,896	76,777	92,311	41,220	1,008,204	592,437	90,605	94,874	10,710	788,626
New Bruns...	189,580	6,053	40,192	26,940	262,765	172,759	4,743	31,462	14,338	223,302
Quebec...	10,190,299	201,878	929,250	774,339	12,095,766	6,442,219	146,126	563,471	474,039	7,625,855
Ontario...	10,690,336	244,379	1,358,197	1,987,716	14,280,628	9,779,302	181,762	1,061,856	1,752,366	12,775,286
Manitoba...	260,701	59,141	63,885	124,507	508,234	116,301	6,681	40,376	73,224	236,582
S'chewan...	883,806	5,105	71,800	66,930	1,027,641	439,443	11,717	26,791	46,024	523,975
Alberta...	1,829,747	50,271	217,991	218,718	2,316,727	1,300,196	83,755	190,040	183,202	1,757,193
British C...	1,245,755	25,280	225,059	163,605	1,659,699	718,270	16,843	161,192	82,896	979,291
Total for Canada...	26,088,120	668,884	2,998,685	3,403,975	33,159,664	19,560,927	542,232	2,170,062	2,636,799	24,910,020
Stoneware and pottery—										
Total for Canada...	488,776	22,342	76,373	72,009	659,500	283,281	28,579	69,783	55,919	437,562
By PROVINCES—										
<i>Total for clay and clay products—</i>										
N. Scotia...	797,896	76,777	92,311	41,220	1,008,204	592,437	90,605	94,874	10,710	788,626
N. Bruns...	199,980	8,104	48,899	33,117	290,100	182,858	8,435	37,556	23,754	252,603
Quebec...	10,190,299	201,878	929,250	774,339	12,095,766	6,442,219	146,126	563,471	474,039	7,625,855
Ontario...	10,745,336	245,979	1,366,418	2,027,716	14,385,449	9,834,627	182,813	1,073,166	1,785,016	12,875,622
Manitoba...	260,701	59,141	63,885	124,507	508,234	116,301	6,681	40,376	73,224	236,582
S'chewan...	883,806	5,105	71,800	66,930	1,027,641	439,443	11,717	26,791	46,024	523,975
Alberta...	2,253,123	68,962	277,436	244,556	2,844,071	1,511,053	107,091	239,319	196,055	2,053,518
British C...	1,245,755	25,280	225,059	163,605	1,659,699	725,270	17,343	164,292	83,896	990,801
Canada...	26,576,896	691,226	3,075,058	3,475,984	33,819,164	19,844,208	570,811	2,239,845	2,692,718	25,347,582

*Clay, sewer pipe, firebrick, firebrick products and other clays included under Brick and Tile.

Table 273.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1931 and 1932

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
1931						
Nova Scotia.....	12	148	160	27,837	120,608	148,445
New Brunswick.....	9	68	77	20,084	46,728	66,812
Quebec.....	107	771	878	245,432	782,010	1,027,442
Ontario.....	219	1,225	1,444	446,711	1,170,337	1,617,048
Manitoba.....	16	79	95	26,400	50,872	77,272
Saskatchewan.....	14	63	77	27,738	37,538	65,276
Alberta.....	34	220	254	77,977	197,160	275,137
British Columbia.....	24	250	274	46,602	217,216	263,818
Canada.....	435	2,824	3,259	918,781	2,622,469	3,541,250
1932						
Nova Scotia.....	9	114	123	22,929	70,199	93,128
New Brunswick.....	9	43	52	15,669	20,390	36,059
Quebec.....	66	299	365	102,227	225,604	327,831
Ontario.....	160	637	797	297,565	446,925	744,490
Manitoba.....	5	13	18	11,200	9,778	20,978
Saskatchewan.....	11	30	41	22,146	25,813	47,959
Alberta.....	26	158	184	56,881	128,438	185,319
British Columbia.....	18	142	160	37,058	83,764	120,822
Canada.....	304	1,436	1,740	565,675	1,010,911	1,576,586

*See note page 36.

In this section all tables except Table 276 show data for domestic clay products only.

Table 274.—Production of Clay Products in Canada from Domestic Clays, by Provinces, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Prince Edward Island	Nova Scotia	New Brun- swick	Quebec	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1923.....		413,974	62,587	2,439,598	6,270,615	160,134	119,405	590,565	426,138	10,483,016
1924.....	3,340	355,948	74,994	2,435,695	5,089,299	117,450	137,280	540,477	460,594	9,215,077
1925.....	3,020	422,690	69,473	2,426,887	5,195,084	173,794	95,952	618,860	523,931	9,529,691
1926.....		362,667	75,851	2,702,298	5,356,469	248,497	214,113	804,933	592,495	10,357,323
1927.....		416,417	87,185	2,734,738	5,853,035	201,464	311,204	889,358	679,788	11,173,189
1928.....		496,577	72,192	3,097,295	6,177,664	291,791	377,896	1,162,264	706,039	12,381,718
1929.....		653,157	160,006	3,187,702	6,830,162	362,240	502,522	1,342,427	866,427	13,904,643
1930.....		495,333	162,536	2,464,044	5,221,214	115,967	349,283	997,685	687,516	10,593,578
1931.....		467,126	143,348	2,360,908	3,552,800	122,628	166,257	529,716	498,505	7,841,288
1932.....		172,557	68,151	1,064,551	1,639,508	49,773	109,739	329,584	216,355	3,650,218

Table 275.—Production of Clay Products in Canada, from Domestic Clays, by Provinces, 1930-1932

	1930		1931		1932	
	Sold or used	Per cent of total value	Sold or used	Per cent of total value	Sold or used	Per cent of total value
	\$		\$		\$	
Nova Scotia.....	495,333	4.7	467,126	6.0	172,557	4.7
New Brunswick.....	162,536	1.5	143,348	2.0	68,151	1.9
Quebec.....	2,464,044	23.3	2,360,908	30.0	1,064,551	29.2
Ontario.....	5,221,214	49.3	3,552,800	45.0	1,639,508	44.0
Manitoba.....	215,967	2.0	122,628	2.0	49,773	1.4
Saskatchewan.....	349,283	3.3	166,257	2.0	109,739	3.0
Alberta.....	997,685	9.4	529,716	7.0	329,584	9.0
British Columbia.....	687,516	6.5	498,505	6.0	216,355	5.9
Canada.....	10,593,578	100.0	7,841,288	100.0	3,650,218	100.0

Table 276.—Value of Clay Products Produced in Canada from Domestic and from Imported Clays, 1931 and 1932

Product	From domestic clays		From imported clays		Total	
	1931	1932	1931	1932	1931	1932
	\$	\$	\$	\$	\$	\$
† Fireclay blocks and shapes.....	83,039	75,209	280,588	212,838	363,627	288,047
Sanitary ware.....			*	*		
Ceramic or glazed floor and wall tile.....			*	*		
Pottery, glazed and unglazed.....	257,125	244,861	*	*	257,125	244,861
Electrical porcelain insulators.....			*	*		
Other clay products (brick, tile, sewer pipe, etc.).....	7,501,124	3,330,148	2,175,150	1,377,573	9,676,274	4,707,721
Total.....	7,841,288	3,650,218	2,455,738	1,590,411	10,297,026	5,240,629

*Included with other clay products.

†Includes firebrick and stove linings made in imported-clay products industries.

Table 277.—Production in Canada, Imports and Exports of Clay and Clay Products, 1930-1932

Kind	1930		1931		1932	
	Quantity	Total selling value	Quantity	Total selling value	Quantity	Total selling value
		\$		\$		\$
PRODUCTION—						
Brick: Soft mud process (Face..... M	11,350	247,220	5,476	116,316	6,188	108,582
Common..... M	56,487	861,805	41,177	619,357	12,801	182,372
Stiff mud process (Face..... M	99,284	2,135,871	77,135	1,752,947	30,197	664,756
(wire cut) Common..... M	105,225	1,480,965	81,930	1,205,464	40,753	638,922
Dry press (Face..... M	29,434	604,197	20,149	423,357	5,522	119,547
Common..... M	16,915	208,495	8,688	107,213	4,248	46,762
Fancy or ornamental brick (including special shapes, embossed and enamelled brick)..... M	339	27,649	335	20,773	125	6,237
Sewer brick..... M	804	15,299	2,253	43,692	643	12,156
Paving brick..... M	9	297	19	682	6	155
Firebrick from domestic clay M	3,789	177,608	2,248	107,597	1,580	71,757
Fireclay..... tons	2,870	25,975	1,233	14,857	990	11,826
Kaolin..... tons						
Bentonite..... tons	74	1,396	187	935	7	176
Fireclay blocks and shapes.....		147,309		83,039		75,209
Structural tile—						
Hollow blocks (including fireproof- ing and load-bearing tile)..... tons	165,359	1,667,783	105,635	1,046,634	48,118	421,672
Roofing tile..... No.	3,056	356	6,935	720	48,939	3,900
Floor tile (quarries)..... Sq. ft.	179,786	56,230	107,499	31,415	94,316	21,502
Drain tile..... M	25,291	687,070	12,518	328,410	7,385	186,670
Sewer pipe (including copings, flue linings, etc.).....		1,721,815		1,508,803		813,224
Pottery, glazed or unglazed.....		294,866		257,125		244,861
Other products.....		231,372		171,952		19,932
Total.....		10,593,578		7,841,288		3,650,218
IMPORTS—						
Building brick.....		255,515		204,903		41,163
Building blocks.....		131,569		75,276		15,682
Clays—						
China..... cwt.	462,245	278,757	366,926	192,516	346,270	154,125
Fire..... cwt.	1,147,387	240,293	887,033	167,893	385,956	101,768
Pipe.....		9,262		16,804		18,308
Zirconium silicate.....		6,092		3,122		1,252
Zirconium oxide.....		5,706		7,999		4,574
Other clays.....		155,650		152,270		182,258
Drain tile, unglazed.....		2,076		2		317
Drain sewer pipe and earthenware fittings therefor, chimney linings or vents, chim- ney tops or inverted blocks, glazed or unglazed.....		73,872		53,128		10,856
Insulators, electric, porcelain.....		355,036		231,206		170,908
Farthenware and chinaware.....		4,646,399		3,637,530		3,236,055
Brick, fire, other, valued at not less than \$100 per M, rectangular shaped; the dimensions of each not to exceed 125 cubic inches for use exclusively in the construction or repair of a furnace, kiln, etc.....		64,042		60,420		48,133
Brick, fire, n.o.p., for use exclusively in the construction or repair of a furnace, kiln or other equipment of a manufacturing establishment.....		1,297,778		711,410		384,250
Firebrick, n.o.p.....		53,682		41,382		37,173
Firebrick, chrome.....		73,761		48,230		9,848
Magnesite brick.....		270,180		152,435		71,077
Silica brick.....		315,039		234,909		122,952
Paving brick.....		108,357		84,326		14,446
Other clay manufactures.....		1,853,615		1,553,097		780,605
Total.....		10,196,651		7,628,858		5,405,750
EXPORTS—						
Building brick..... M	1,822	26,150	1,085	21,144	535	8,011
Clay—						
Unmanufactured..... cwt.	9,688	5,900	8,015	4,161	3,031	895
Manufactures.....		36,606		25,736		13,436
Earthenware.....		30,931		33,745		33,391
Porcelain insulators.....		349,533		333,742		140,761
Total.....		449,120		418,528		196,494

Table 278.—Production of Building Brick in Canada by Provinces, 1930-1932

—		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
1930									
Soft mud process	Face.....	M 240			9,798			1,312	
	\$ 3,360				201,860			42,000	
	Common.....	M 730	3,877	1,258	24,674	9,720	1,189	7,298	7,741
	\$ 9,718		62,625	12,754	375,088	156,585	16,867	92,158	136,010
Stiff mud process (wire cut)	Face.....	M 962	1,124	33,585	57,001	1,204	1,691	2,589	1,128
	\$ 26,608		27,836	743,641	1,178,026	26,604	54,842	37,468	40,846
	Common.....	M 7,212	1,913	65,867	22,800		4,823	2,258	352
	\$ 98,133		28,711	927,218	346,126		55,159	20,549	5,069
Dry press	Face.....	M		2,660	21,835		282	3,751	906
	\$			67,291	431,083		9,058	61,616	34,549
	Common.....	M			4,246			10,886	1,783
	\$				58,530			124,585	25,380
Fancy or ornamental brick.....		\$		74	265				
		\$		3,791	23,858				
Sewer brick.....		\$			722				82
		\$			12,490				2,809
Total.....		M	9,144	6,914	103,444	141,341	10,924	7,985	28,094
		\$	137,819	119,172	1,754,635	2,627,661	183,189	135,926	378,376
1931									
Soft mud process	Face.....	M 120	100		4,954			302	
	\$ 1,560		2,200		105,006			7,550	
	Common.....	M 780	3,134		24,478	5,209	415	1,734	5,427
	\$ 10,660		42,671		373,130	76,688	5,451	22,280	88,477
Stiff mud process (wire cut)	Face.....	M 349	910	32,113	40,935	794	576	675	783
	\$ 9,970		25,669	766,988	873,324	17,577	20,233	12,328	26,848
	Common.....	M 3,728	1,778	56,464	17,008	30	1,831	379	712
	\$ 54,573		26,311	841,868	249,880	360	18,095	3,267	11,110
Dry press	Face.....	M		2,894	13,991		27	2,779	458
	\$			74,970	300,614		720	28,937	18,116
	Common.....	M		250	2,719			3,797	1,922
	\$			2,500	39,767			36,179	28,767
Fancy or ornamental brick.....		\$		76	259				
		\$		3,944	16,829				
Sewer brick.....		\$			1,946				307
		\$			33,321				10,371
Total.....		M	4,977	5,922	91,797	106,290	6,033	2,849	9,669
		\$	76,763	96,851	1,690,270	1,991,881	94,625	44,499	110,541
1932									
Soft mud process	Face.....	M 160		300	5,716				12
	\$ 2,008			3,000	103,390				184
	Common.....	M 540	1,269	18	6,525	1,337	660	697	1,755
	\$ 6,780		18,180	912	98,828	18,166	6,929	8,345	24,232
Stiff mud process (wire cut)	Face.....	M 347	487	13,180	15,315	320	115	277	156
	\$ 6,754		13,628	300,649	323,077	7,472	3,127	6,386	3,663
	Common.....	M 2,229	520	28,063	7,816	416	220	989	500
	\$ 31,206		7,949	448,470	122,905	6,861	2,256	11,648	7,627
Dry press	Face.....	M		319	4,667		6	310	220
	\$			9,563	97,897		138	3,876	8,073
	Common.....	M			1,522			2,726	
	\$				24,070			22,692	
Fancy or ornamental brick.....		\$		89	36				
		\$		4,447	1,790				
Sewer brick.....		\$			638				5
		\$			12,071				85
Total.....		M	3,276	2,276	41,969	42,235	2,073	4,999	2,648
		\$	46,748	39,757	767,041	784,028	32,499	12,450	52,947

Table 279.—Production of Building Brick in Canada, 1924-1932

		Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or orna- mental brick	Sewer brick	Total
		Face	Common	Face	Common	Face	Common			
1924.....	M	10,831	50,079	80,565	124,556	35,203	12,794	755	2,690	317,473
	\$	185,248	746,044	1,842,224	1,880,631	761,572	168,043	98,460	40,775	5,722,997
1925.....	M	27,701	51,214	93,903	116,105	37,201	22,053	524	2,485	351,186
	\$	521,739	753,970	1,883,856	1,635,257	800,504	270,135	26,320	52,382	5,944,163
1926.....	M	28,235	78,158	101,028	94,046	30,423	19,450	462	6,546	358,348
	\$	556,573	1,145,490	2,146,362	1,624,055	651,236	260,598	24,057	117,194	6,525,565
1927.....	M	16,196	70,554	95,480	150,222	39,753	14,617	620	10,997	398,439
	\$	325,966	1,091,274	2,024,064	2,239,180	833,570	187,062	29,372	210,643	6,941,131
1928.....	M	17,532	93,280	101,717	144,404	36,587	24,294	599	2,888	421,301
	\$	349,847	1,328,981	2,247,472	2,182,307	748,301	337,096	28,763	59,010	7,281,777
1929.....	M	26,624	77,399	114,093	170,840	38,591	26,131	187	4,765	458,630
	\$	538,096	1,195,511	2,469,417	2,509,451	813,461	368,039	12,795	96,588	8,003,358
1930.....	M	11,350	56,487	99,284	105,225	29,434	16,915	339	804	319,838
	\$	247,220	861,805	2,135,871	1,480,965	604,197	208,495	27,649	15,299	5,581,501
1931.....	M	5,476	41,177	77,135	81,930	20,149	8,688	335	2,253	237,143
	\$	116,316	619,357	1,752,947	1,205,464	423,357	107,213	20,773	43,692	4,289,119
1932.....	M	6,188	12,801	30,197	40,753	5,522	4,248	125	643	190,477
	\$	108,582	182,372	664,756	638,922	119,547	46,762	6,237	12,156	1,779,334

Table 280.—Production of Paving Brick in Canada, 1923-1932

NOTE.—For years 1897 to 1922 see previous reports.

Year	Quantity	Value
	M	\$
1923-25.....	122	5,015
1926.....	50	2,106
1927.....	338	4,464
1928.....	97	3,844
1929.....	9	297
1930.....	19	682
1931.....	6	155
1932.....		

Table 281.—Production of Structural Tile in Canada, by Provinces, 1930-1932

Province	Hollow blocks (includ- ing fireproofing and load-bearing tile)		Roofing tile		Floor tile (quarries)	
	Tons	Value	No.	Value	Sq. ft.	Value
		\$		\$		\$
1930						
Nova Scotia.....	9,378	107,998				
New Brunswick.....	600	8,888				
Quebec.....	39,769	484,605				
Ontario.....	85,155	791,474	3,056	356	179,047	56,054
Manitoba.....	1,335	17,754				
Saskatchewan.....	7,566	60,214			739	176
Alberta.....	13,123	111,807				
British Columbia.....	8,433	85,043				
Canada.....	165,359	1,667,783	3,056	356	179,786	56,230
1931						
Nova Scotia.....	7,372	86,632				
New Brunswick.....	1,776	16,706				
Quebec.....	41,585	477,720				
Ontario.....	41,774	346,079	6,935	720	17,418	31,395
Manitoba.....	1,278	15,703				
Saskatchewan.....	3,177	28,299			81	20
Alberta.....	5,360	42,276				
British Columbia.....	3,313	33,219				
Canada.....	105,635	1,046,634	6,935	720	107,499	31,415
1932						
Nova Scotia.....	3,162	30,208				
New Brunswick.....	134	1,120				
Quebec.....	20,170	193,335				
Ontario.....	18,941	144,471	48,939	3,900	94,316	21,502
Manitoba.....	1,167	11,965				
Saskatchewan.....	1,322	11,781				
Alberta.....	2,106	17,055				
British Columbia.....	1,116	11,737				
Canada.....	48,118	421,672	48,939	3,900	94,316	21,502

Table 282.—Production of Sewer Pipe, Copings, Flue Linings, etc., in Canada, 1923-1932

(For the years 1888 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	70,252	1,616,324	1928.....		1,723,644
1924.....	76,355	1,594,280	1929.....		2,005,887
1925.....	73,791	1,440,269	1930.....		1,721,815
1926.....	75,996	1,480,776	1931.....		1,508,803
1927.....	77,262	1,475,875	1932.....		813,224

Table 283.—Production of Drain Tile in Canada, 1923-1932

(For the years 1891 to 1922 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1923.....	10,599	323,314	1928.....	22,629	656,054
1924.....	15,137	409,369	1929.....	25,000	720,316
1925.....	14,552	401,503	1930.....	25,291	687,070
1926.....	14,258	396,018	1931.....	12,518	328,410
1927.....	22,259	598,098	1932.....	7,385	186,670

Table 284.—Production of Drain Tile and Sewer Pipe, in Canada, by Provinces, 1931 and 1932

Province	1931				1932			
	Drain tile		†Sewer pipe		Drain tile		†Sewer pipe	
	M	\$	Tons	\$	M	\$	Tons	\$
Nova Scotia.....	159	6,611		295,405	71	2,974		92,070
New Brunswick.....	3	127			3	120		
Quebec.....	696	24,864		168,054	545	20,609		83,566
Ontario.....	10,210	244,368		696,964	5,886	135,004		466,371
Manitoba.....	248	12,300			103	5,309		
Saskatchewan.....								
Alberta.....	55	1,721		227,305	130	1,322		112,810
British Columbia.....	1,147	38,419		121,075	647	21,332		58,407
Canada.....	12,518	328,410		1,508,803	7,385	186,670		813,224

†Includes copings, flue linings, etc.

Table 285.—Production of Pottery from Domestic Clays in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Value	Year	Value
	\$		\$
1923.....	229,547	1928.....	356,093
1924.....	238,342	1929.....	323,194
1925.....	267,255	1930.....	294,866
1926.....	320,135	1931.....	257,125
1927.....	307,057	1932.....	244,861

Table 286.—Production of Kaolin in Canada, 1922-1932

NOTE.—For years 1912 to 1921 see previous reports.

Year	Tons	Value
		\$
1922.....	1,197	17,866
1923.....	163	2,369
1924-1926.....		
1927.....	24	120
1928.....	5	25
1929-1932.....		

Table 287.—Production of Fireclay in Canada, 1923-1932

(For years 1899 to 1922 see Mineral Production of Canada, 1928)

Year	Quantity	Value	Year	Quantity	Value
	Tons	\$		Tons	\$
1923.....	2,685	24,158	1928.....	5,123	35,284
1924.....	3,645	26,258	1929.....	5,041	35,226
1925.....	623	6,544	1930.....	2,870	25,975
1926.....	2,513	23,258	1931.....	1,233	14,857
1927.....	5,070	35,961	1932.....	990	11,826

Table 288.—Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1923-1932

(For the years 1907 to 1922 see Mineral Production of Canada, 1928)

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1923.....	6,122	295,037	81,345	1928.....	4,910	234,460	105,091
1924.....	4,327	209,256	51,273	1929.....	5,196	251,043	130,411
1925.....	6,197	305,332	36,567	1930.....	3,789	177,608	147,309
1926.....	4,195	192,276	54,064	1931.....	2,248	107,597	83,039
1927.....	5,388	246,266	100,659	1932.....	1,580	71,757	75,209

Table 289.—Production of Refractories, in Canada, from Domestic Clays, by Provinces, 1931 and 1932

Province	1931					1932				
	Fireclay		Firebrick		Fire-clay blocks and shapes	Fireclay		Firebrick		Fire-clay blocks and shapes
	Quantity	Value	Quantity	Value	Value	Quantity	Value	Quantity	Value	Value
	Tons	\$	M	\$	\$	Tons	\$	M	\$	\$
Nova Scotia.....	65	650	7	240	825	45	280			277
New Brunswick.....	48	1,930			535	50	1,956			836
Saskatchewan.....	484	3,915	415	24,568	63,603	415	3,111	309	15,200	66,688
Alberta.....			24	1,193				11	547	
British Columbia.....	636	8,362	1,802	81,596	18,076	480	6,479	1,260	56,010	7,408
Canada.....	1,233	14,857	2,248	107,597	83,039	990	11,826	1,580	71,757	75,209

Table 290.—World Production of China Clay

Country	1930	1931	1932	Country	1930	1931	1932
BRITISH EMPIRE				FOREIGN COUNTRIES—CON.			
United Kingdom.....	716,319	570,524	508,850	Saxony—			
India.....	19,116	23,365	13,486	Crude.....	51,327	39,666	(a)
Unfederated Malay States..	410	396	186	Washed.....	47,487	35,618	(a)
Australia.....	4,771	6,188	(b) 3,106	Italy—			
FOREIGN COUNTRIES				Crude.....	12,308	23,023	(a)
Belgium (e).....	9,301	18,031	(a)	Washed and ground (c).....	4,839	4,500	(a)
Bulgaria.....	5,656	1,360	(a)	Kaolinic earth.....	10,035	900	(a)
Czechoslovakia (estimated)	400,000	400,000	350,000	Portugal.....	4,601	6,513	6,763
Denmark—				Roumania (d).....	6,666	4,854	8,128
Crude.....	29,405	35,200	29,300	Spain (g).....	800	900	1,152
Washed and pressed.....	7,700	8,100	8,500	Algeria.....	2,523	(a)	2,975
Dried.....		1,700	800	United States (f).....	476,600	395,800	325,843
France.....	156,300	(a)	(a)	Argentina.....	369		
Germany—				China.....	778,000	772,000	(a)
Bavaria.....	366,712	327,520	(a)	Japan (estimated).....	400,000	400,000	400,000
Prussia.....	12,844	10,797	8,352	Korea.....	8,134	4,700	(a)
				Sweden.....		1,497	1,389
				Chile.....	800	(a)	(a)
				Netherlands East Indies...	(a)	202	120

NOTE.—77,585 long tons of china clay were recorded as produced in U.S.S.R. (Russia) during the year ended September 1928—later figures are not available.

(a) Information not available.

(b) Excluding production of Victoria, which is not available but amounted to 2,973 long tons in 1931.

(c) Derived from crude and stocks.

(d) Converted from cubic metres at the rate of 1 cubic metre=2 long tons.

(e) "Eurite" and kaolin.

(f) Sales of china clay and paper clay.

(g) 2,100 and 74,930 cubic metres of kaolinic sand were also produced in quarries during 1930 and 1931 respectively; and 3,940 cubic metres during 1932.

IMPORTED CLAY PRODUCTS

In continuance of the custom followed in previous material production reports, a short review of the imported-clay products industry is given herewith.

Sixteen factories in Canada made ceramic products in 1932 from clays which they imported, chiefly from England and the United States. High tension porcelain insulators were made in 2 works, other electrical porcelains in 3, sanitary earthenware in 2, pottery in 2, firebrick and stove linings in 5, sewer pipe in 2, and floor tile in 1 plant. Twelve of the factories were in Ontario and 4 in Quebec.

Employees in 1932 numbered 715 and their receipts in salaries and wages amounted to \$707,269. Capital employed was reported at \$4,207,767 and the selling value of products at works totalled \$1,590,411. Cost of materials amounted to \$406,441 and the value added by manufacturing was \$1,183,970.

Table 291.—Capital Employed in the Imported-Clay Products Industry in Canada, 1931 and 1932

	1931	1932
CAPITAL EMPLOYED AS REPRESENTED BY:	\$	\$
(a) Cost of land, buildings, fixtures, machinery, tools and other equipment (estimated value if rented).....	2,819,285	2,901,914
(b) Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	391,375	318,321
(c) Inventory value of finished products on hand.....	308,095	445,011
(d) Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	801,627	542,521
Total.....	4,320,382	4,207,767

Table 292.—Employees, Salaries and Wages in the Imported-Clay Products Industry in Canada, by Provinces, 1931 and 1932

Province	*Average number of employees					Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Male	Female				
1931						\$	\$	\$
Quebec.....	24	3	242	6	275	66,013	283,411	349,424
Ontario.....	45	14	420	78	557	160,754	448,722	609,476
Canada.....	69	17	662	84	832	226,767	732,133	958,900
1932								
Quebec.....	28	3	190	6	227	80,160	195,698	275,858
Ontario.....	46	12	351	79	488	132,969	298,442	431,411
Canada.....	74	15	541	85	715	213,129	494,140	707,269

*See note page 36.

LIME, 1932

Canadian production of lime, including both quick and hydrated, amounted to 320,650 tons valued at \$2,394,537 during 1932 as compared with 344,785 tons worth \$2,764,415 in 1931 and 490,802 tons at \$4,038,698 in 1930. Producers received an average of \$7.14 per ton for quicklime and \$9.14 for hydrated lime as compared with \$7.38 and \$10.71, respectively, in 1931. Prices in 1930 were \$7.68 per ton for quicklime and \$11.30 for hydrated.

The decrease of 7 per cent in volume and 13 per cent in value in the 1932 production from the preceding year resulted largely through a continuation of relatively adverse conditions in general construction and pulp and paper manufacturing.

It is interesting to note that the consumption of lime increased in the gold mining and chemical, fertilizer, tanning and sugar industries. Increases recorded for metallurgical purposes especially reflects recent expansion in the milling of auriferous quartz ores.

Of the total 1932 production the pulp and paper mills consumed 71,292 tons or 22 per cent; the building trades, 47,507 tons or 14.8 per cent; cyanide mills, 19,060 tons or 5.9 per cent; sugar refineries, 14,042, tons or 4.4 per cent; iron and steel mills, 13,916 tons or 4.3 per cent, and the balance was used principally in various chemical processes including the manufacture of calcium carbide, fertilizer, glass and other products. Appreciable quantities of both quick and hydrated lime were utilized direct for agricultural purposes.

In 1932 the Canadian lime producers reported the total capital employed at \$6,823,949; salaried employees and wage earners totalled 677; salaries and wages amounted to \$575,072, and fuel and electricity consumed were recorded at \$535,433.

The United States Bureau of Mines states that a small demand and lower prices were generally reported for all classes of lime in that country with decreases in output ranging from 10 per cent to 75 per cent or more for producing companies. Few firms reported increases and several plants were shut down the entire year.

Table 293.—Capital Employed in the Lime Industry in Canada, by Provinces, 1931 and 1932

Province	1931					1932				
	Capital employed as represented by					Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable, etc.	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
New Brunswick*.....	143,000	17,900	9,424	26,200	196,524	217,079	19,719	7,604	23,689	268,091
Quebec.....	1,712,640	134,375	24,458	207,726	2,079,199	1,516,611	107,039	3,822	116,127	1,743,599
Ontario.....	3,416,925	72,123	36,843	77,598	3,603,490	3,239,608	51,647	18,167	115,360	3,424,732
Manitoba.....	612,513	15,850	1,922	645	630,930	601,059	11,641	2,213	3,000	617,913
Alberta.....	156,278	7,505	2,304	32,034	198,121	156,211	7,307	1,894	31,278	196,690
British Columbia.....	447,037	37,498	12,859	84,332	581,726	453,787	28,701	14,232	76,154	572,874
Canada.....	6,488,394	285,251	87,810	428,535	7,289,990	6,184,355	226,054	47,932	365,608	6,823,949

* Includes data for 2 firms in Nova Scotia.

Table 294.—Employees, Salaries and Wages in the Lime Industry in Canada, by Provinces, 1931 and 1932

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
1931						
New Brunswick†.....	7	84	91	10,700	72,248	82,948
Quebec.....	17	203	220	29,114	181,493	210,607
Ontario.....	27	228	255	40,388	216,234	256,622
Manitoba.....	7	72	79	10,820	61,957	72,777
Alberta.....	3	14	17	4,800	14,907	19,707
British Columbia.....	17	120	137	25,703	117,504	143,207
Canada.....	78	721	799	121,525	664,343	785,868
1932						
New Brunswick†.....	10	56	66	12,975	43,552	56,527
Quebec.....	19	220	239	28,800	141,799	170,599
Ontario.....	19	182	201	27,676	161,752	189,428
Manitoba.....	7	65	72	10,144	50,359	60,503
Alberta.....	3	14	17	4,800	11,257	16,057
British Columbia.....	12	70	82	21,755	60,203	81,958
Canada.....	70	607	677	106,150	468,922	575,072

* See note page 36.

† Includes data for 2 firms in Nova Scotia.

Table 295.—Production of Lime in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value \$	Year	Tons	Value \$
1923.....	351,236	3,266,608	1928.....	508,889	4,534,568
1924.....	319,793	3,178,541	1929.....	674,087	5,908,610
1925.....	358,979	3,387,652	1930.....	490,802	4,038,698
1926.....	413,901	3,781,484	1931.....	344,785	2,764,415
1927.....	444,753	3,923,388	1932.....	320,650	2,394,537

Table 296.—Production of Lime in Canada, 1931 and 1932, Showing Purposes for Which Sold or Used

Purposes for which sold or used	1931				1932			
	Quicklime		Hydrated lime		Quicklime		Hydrated lime	
	Tons	Value \$	Tons	Value \$	Tons	Value \$	Tons	Value \$
Building Trades—								
Finishing lime.....	6,496	53,335	28,724	359,915	2,462	23,115	21,251	255,468
Masons' lime.....	29,874	283,241	9,587	96,832	16,375	140,955	4,617	46,386
Sand-lime brick.....	11,419	80,666	358	3,659	2,793	20,260	9	113
Agricultural.....	420	4,830	1,312	11,539	1,186	11,115	1,924	17,070
Chemical—								
Smelters.....	3,609	28,635	2,605	22,691	5,073	41,878	530	4,610
Iron and steel mills.....	21,155	101,425	3	37	13,888	84,325	28	211
Cyanide mills.....	18,135	125,977	25	263	19,043	132,911	17	139
Pulp and paper mills.....	66,913	448,903	12,980	120,355	53,347	343,479	17,945	103,225
Glass works.....	6,129	48,407			5,920	44,586		
Sugar refineries.....	11,454	107,828	65	925	14,022	117,609	20	250
Tanneries.....	1,859	14,847	130	1,077	2,467	17,304	242	1,691
Other chemical works.....	84,528	593,412	2,247	22,537	120,582	845,628	2,348	21,052
Dealers (uses unspecified).....	8,719	85,620	5,309	42,213	9,745	84,150	3,451	28,807
Other consumers.....	8,798	87,858	1,932	17,388	1,365	8,200		
Total.....	279,508	2,064,984	65,277	699,431	268,268	1,915,515	52,382	479,022

Table 297.—Production of Lime in Canada, by Provinces, 1930-1932

Province		Quicklime		Hydrated lime		Total	
		Sold or used		Sold or used		Sold or used	
		Tons	Value	Tons	Value	Tons	Value
			\$		\$		\$
Nova Scotia.....	1930	30,462	106,730	652	6,520	31,114	113,250
	1931	17,790	73,018	640	6,400	18,430	79,418
	1932	6,075	30,954	458	4,580	6,533	35,534
New Brunswick.....	1930	9,947	104,159	2,574	31,145	12,521	135,304
	1931	5,161	61,729	6,080	65,325	11,241	127,054
	1932	5,547	59,064	6,025	50,120	11,572	109,184
Quebec.....	1930	117,358	874,077	11,992	93,573	129,350	967,650
	1931	101,186	720,049	10,310	84,169	111,496	804,218
	1932	76,983	493,787	16,830	94,114	93,813	587,901
Ontario.....	1930	209,340	1,673,409	42,726	504,178	252,066	2,177,587
	1931	113,376	842,274	34,284	379,996	147,660	1,222,270
	1932	143,185	1,018,007	23,518	255,223	166,703	1,273,230
Manitoba.....	1930	17,587	143,955	6,511	116,370	24,098	260,325
	1931	16,575	126,789	4,439	80,612	21,014	207,401
	1932	15,047	116,369	3,188	55,741	18,235	172,110
Alberta.....	1930	5,123	49,330	13	195	5,136	49,525
	1931	5,056	46,047	62	738	5,118	46,785
	1932	6,529	55,336	113	1,241	6,642	56,577
British Columbia.....	1930	27,104	251,479	9,413	83,578	36,517	335,057
	1931	20,364	195,078	9,462	82,191	29,826	277,269
	1932	14,902	141,998	2,250	18,003	17,152	160,001
Canada.....	1930	416,921	3,203,139	73,881	835,559	490,802	4,038,698
	1931	279,598	2,064,984	65,277	699,431	344,755	2,764,415
	1932	268,268	1,915,515	52,382	479,022	320,650	2,394,537

Table 298.—Imports into Canada and Exports of Lime, 1930-1932

Item	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Imports.....	2,096	28,107	568	10,561	322	6,241
Exports.....	22,364	444,728	14,425	283,459	9,344	188,329

SAND AND GRAVEL

Production statistics for the sand and gravel industry in Canada were first collected in 1912. Prior to that year the only data available consist of Customs' records of sand and gravel exported. In 1886 exportations amounted to 124,865 tons; twenty-four years later exports had risen to 624,824 tons appraised at \$407,974. During 1912, production was valued at \$1,512,099 and wages paid to the 875 pit employees totalled \$527,425. It was not until 1916 that tonnage statements were obtained from the operators in this industry; the total for that year amounted to 8,156,207 tons at \$1,838,320. Since 1918, the annual production has exceeded the 10-million ton mark. The highest market valuation per ton for this material was received in 1920, when 11,530,795 tons were sold for \$4,201,067. During that year, the 186 producers employed 1,546 men whose total earnings were \$1,343,212.

Sand and gravel production in Canada during 1932 amounted to 14,469,942 tons valued at \$4,480,596 as compared with the high record production of 28,547,511 tons worth \$8,344,913 in 1930 and 21,748,586 tons at \$6,651,165 in 1931. This decrease reflects the more or less general industrial depression existing throughout the world, especially in the building trades.

It is interesting to note that the committee on filtering materials of the sanitary division of the American Society of Civil Engineers, which recently met at Memphis, Tenn., during the convention of the American Water Works Association, have just issued final instructions for conducting tests on experimental filters. The instructions give details as to erection of filters, calibration of filter tubes, grading of sand, placing of sand in filters, filter sand, gravel, rate

controllers, filter runs and washing of filters. This study will necessarily take a considerable time longer to complete, but the outcome of it is expected to result in marked progress being made, leading ultimately to the general use of a coarser sand for rapid sand filtration.

Table 299.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1931 and 1932

Province	1931					1932				
	Capital employed as represented by					Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable, etc.	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....						81,000			49,000	130,000
New Brunswick.....										
Quebec.....	510,384	15,000	10,800	63,275	599,459	47,195	756		2,350	50,301
Ontario.....	4,923,834	57,840	103,906	685,551	5,771,131	632,401	30,850	8,900	8,310	680,461
Manitoba.....	598,033	3,177	52,346	243,895	897,451	5,494,391	64,384	107,371	753,330	6,419,476
Saskatchewan.....						594,601	3,107	37,502	189,990	825,200
Alberta.....	84,000	5,000		35,000	124,000					
British Columbia.....						359,086	45	987		360,118
Canada.....	1,189,082	2,977	6,455	44,686	1,243,200	1,024,568		18,530	33,792	1,076,890
	7,305,333	83,994	173,507	1,072,407	8,635,241	8,233,242	99,142	173,290	1,036,772	9,542,446

Table 300.—Employees, Salaries and Wages in the Sand and Gravel Industry, by Provinces, 1931 and 1932

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
1931						
Nova Scotia.....		199	199		165,815	165,815
New Brunswick.....		10	10		11,318	11,318
Quebec.....	18	1,540	1,558	29,792	1,099,851	1,129,643
Ontario.....	78	577	655	165,217	639,103	804,320
Manitoba.....	11	122	133	22,444	152,879	175,323
Saskatchewan.....	3	325	328	4,000	198,896	202,896
Alberta.....		149	149		127,301	127,301
British Columbia.....	20	172	192	36,028	225,367	261,395
Canada.....	130	3,094	3,224	257,481	2,620,530	2,878,011
1932						
Nova Scotia.....		92	92		86,097	86,097
New Brunswick.....	1	373	374	1,482	257,336	258,818
Quebec.....	18	341	359	23,363	157,123	180,486
Ontario.....	50	442	492	103,433	249,048	352,481
Manitoba.....	9	174	183	18,065	147,930	165,995
Saskatchewan.....		21	21		12,548	12,548
Alberta.....	1	126	127	410	163,279	163,689
British Columbia.....	13	82	95	18,465	83,622	102,087
Canada.....	92	1,651	1,743	165,218	1,156,983	1,322,201

* See note, page 36.

Table 301.—Production of Sand and Gravel in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	12,752,515	3,016,518	1928.....	28,102,917	5,809,431
1924.....	11,603,500	3,181,083	1929.....	27,846,945	7,317,814
1925.....	11,018,647	3,220,410	1930.....	28,547,511	8,344,913
1926.....	17,112,798	4,941,434	1931.....	21,748,586	6,651,165
1927.....	22,952,819	6,055,601	1932.....	14,469,942	4,480,596

Table 302.—Production in Canada, Imports and Exports of Sand and Gravel, 1930-1932

Kind	1930			1931			1932		
	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value	Washed or screened	Bank or pit-run	Total value
PRODUCTION—	Tons	Tons	\$	Tons	Tons	\$	Tons	Tons	\$
Sand—									
Moulding sand.....	202	43,440	31,768	30	13,851	9,940	178	8,315	5,355
Building sand and sand for concrete, roadwork, etc.....	3,036,318	406,867	1,399,044	1,671,798	1,517,450	1,069,210	1,930,323	437,981	745,091
Core sand.....		3,968	5,090		2,158	3,237	100	600	1,125
Other sand (including blast and engine sands).....		69,484	16,162	84,936	48,301	43,123	2,204	41,584	13,474
Sand and Gravel—									
Sand and gravel for railway ballast....	192,903	6,559,517	961,462	1,296	3,592,155	459,531	23,363	2,073,861	324,648
Sand and gravel for concrete, roads, etc.....	4,892,140	12,517,450	5,569,202	5,551,284	8,800,999	4,784,298	5,399,762	4,204,351	3,181,105
Crushed gravel.....	452,785	372,437	362,185	326,767	137,561	281,826	319,160	28,16	209,798
Total.....	8,574,348	19,973,163	8,344,913	7,636,111	14,112,475	6,651,165	7,675,090	6,794,852	4,480,596
Imports—		\$			\$			\$	
Sand, silica, for glass and carborundum manufacture, etc....	164,349	352,796		107,712	235,191		59,176	162,869	
Sand and gravel, n.o.p.	185,362	167,642		155,482	139,935		36,387	48,677	
Total.....	349,711	520,438		263,194	375,126		95,563	211,546	
EXPORTS.....	2,586,461	465,292		485,813	146,060		177,710	33,620	

NOTE.—Production includes all classes of sand and gravel.

Table 303.—Production of Sand and Gravel in Canada, by Railway Operators, 1930-1932

Kind	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Sand—						
Moulding sand.....						
Building sand and sand for concrete, roads, etc.....	2,649	233	358,926	33,995	2,359	636
Other sand (including blast, core and engine sands).....	58,056	8,396	31,425	5,162	35,051	7,419
Sand and Gravel—						
Sand and gravel for railway ballast.....	6,133,237	807,174	3,591,925	459,173	2,056,715	312,689
Sand and gravel for concrete, roads, etc....	1,268,427	197,782	214,721	41,120	103,834	23,213
Crushed gravel.....	252,176	20,431	22,349	1,656		
Total.....	7,714,545	1,034,016	4,219,346	541,106	2,197,959	343,957

Table 304.—Production of Sand and Gravel in Canada, by Operators Other than Railways, 1930-1932

Kind	1930			1931			1932		
	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
	Tons	Tons	\$	Tons	Tons	\$	Tons	Tons	\$
Sand—									
Moulding sand.....	202	43,440	31,768	30	13,851	9,940	178	8,315	5,355
Building sand and sand for concrete, roads, etc.....	3,036,318	404,218	1,398,811	1,671,798	1,158,524	1,035,215	1,930,323	435,622	744,455
Core sand.....		3,968	5,090		2,158	3,237	100	600	1,125
Other sand (including blast, and engine sands).....		11,428	7,766	84,936	16,876	37,961	2,204	6,533	6,055
Sand and Gravel—									
Sand and gravel for railway ballast.....	192,903	426,280	154,288	1,296	230	358	23,363	17,146	11,959
Sand and gravel for concrete, roads, etc....	4,892,140	11,249,023	5,371,420	5,551,284	8,586,278	4,743,178	5,399,762	4,109,517	3,157,892
Crushed gravel.....	452,785	120,261	341,754	326,767	115,212	280,170	319,160	28,160	209,798
Total.....	8,574,348	12,253,618	7,310,897	7,636,111	9,893,129	6,110,059	7,675,090	4,596,893	4,136,639

Table 305.—Production of Sand and Gravel in Canada, by Provinces, 1930-1932
 Table 305.—Production of Sand and Gravel in Canada, by Provinces, 1930-1932—Con.

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
1930								
Sand—								
Moulding sand.....tons	30	9,450		32,551	700			911
\$	75	7,000		22,845	1,083			765
Building sand and sand for concrete, roadwork, etc.....tons	27		1,337,072	1,922,749	29,182	2,700	15,500	135,895
\$	14		474,263	842,771	10,465	1,200	6,496	63,835
Core sand.....tons				3,846	122			
\$				5,000	90			
Other sand (including blast sand, engine sand, etc.).....tons	3,849	803	3,375	36,689	1,323	13,892		9,553
\$	3,464	227	694	6,146	196	2,100		3,335
Sand and Gravel—								
Sand and gravel for railway ballast.....tons	191,943	328,881	855,597	1,729,855	64,708	2,309,412	908,523	363,501
\$	33,594	31,319	187,161	201,512	13,758	306,647	149,644	37,827
Sand and gravel for concrete, roads, etc.....tons	329,834	18,417	4,317,408	7,755,385	1,033,351	1,293,799	702,906	1,958,490
\$	273,260	2,757	1,083,008	2,469,117	361,116	405,832	277,081	697,031
Crushed gravel.....tons			68,355	546,007	123,717	60,750		26,393
\$			5,564	236,439	67,236	36,000		16,946
Total.....tons	525,683	357,551	6,581,807	12,027,082	1,253,103	3,680,553	1,626,989	2,494,743
\$	310,407	41,303	1,750,690	3,783,830	453,944	751,779	433,221	819,739
1931								
Sand—								
Moulding sand.....tons	30			13,588	125			138
\$	75			9,437	188			240
Building sand and sand for concrete, roadwork, etc.....tons	3,000		1,474,242	1,336,353	50,217	35,263	145,216	144,957
\$	750		450,798	533,250	11,356	4,039	15,357	53,660
Core sand.....tons				1,850				
\$				2,775	462			
Other sand (including blast sand, engine sand, etc.).....tons	880		11,893	77,194	5,105	17,820	3,734	16,611
\$	792		15,515	19,156	1,729	2,411	558	2,962
Sand and Gravel—								
Sand and gravel for railway ballast.....tons	62,554	154,059	1,139,845	644,929	37,407	770,835	351,088	432,734
\$	8,578	13,816	152,504	83,181	5,023	101,583	45,997	48,849
Sand and gravel for concrete, roads, etc.....tons	337,394	29,416	4,923,235	5,183,126	695,185	524,176	550,950	2,108,801
\$	188,562	4,333	1,243,991	1,792,781	246,718	258,674	251,704	797,553
Crushed gravel.....tons			108,749	207,977	83,639	40,500		23,465
\$			90,151	121,897	28,702	30,000		11,076
Total.....tons	403,858	183,475	7,657,964	7,465,017	871,986	1,388,594	1,050,988	2,726,704
\$	198,757	18,149	1,952,959	2,562,477	294,178	396,707	313,616	914,322
1932								
Sand—								
Moulding sand.....tons	34		144	7,864	417			34
\$	78		62	4,389	620			206
Building sand and sand for concrete, roadwork, etc.....tons	191,523	12,191	699,504	1,434,751	16,968	8	3,784	9,575
\$	42,567	8,310	228,278	456,039	5,615	14	1,547	2,721
Core sand.....tons				700				
\$				1,125				
Other sand (including blast sand, engine sand, etc.).....tons		581	7,025	4,485	202	15,319	6,129	10,047
\$		155	6,144	850	42	3,120	1,365	1,798
Sand and Gravel—								
Sand and gravel for railway ballast.....tons	12,881	48,148	1,131,464	363,278	28,111	345,572	89,859	77,911
\$	2,000	6,804	173,155	40,963	3,989	63,428	15,493	18,816
Sand and gravel for concrete, roads, etc.....tons	219,049	507,069	1,504,261	5,021,478	378,328	1,942	627,270	1,344,716
\$	92,032	431,910	392,602	1,383,177	174,163	380	225,117	481,724
Crushed gravel.....tons		1,161	115,730	161,891	16,283		7,025	45,230
\$		60	93,655	84,606	4,545		6,503	20,339
Total.....tons	423,487	569,150	3,458,128	6,994,447	440,309	362,841	734,067	1,487,513
\$	136,677	447,239	893,896	1,971,239	188,974	66,942	250,025	525,604

SAND-LIME BRICK

On account of its association with other building materials, data regarding the production of sand-lime brick are included in this report. Statistics relating to sand-lime brick are not included in the totals for structural materials industries as both the sand and lime used have been so recorded; production of sand-lime brick is regarded as a manufacturing operation and therefore is shown in the report on the *Manufactures of the Non-Metallic Minerals*, issued annually by the Bureau.

Production from the sand-lime brick industry was valued at \$153,716 in 1932 compared with \$540,390 in 1931. Inactivity in the building trades was the main cause of this severe decline. Output of sand-lime brick totalled 10,819 M valued at \$131,440 in 1932 as against 46,003 M at \$469,783 in the previous year. Some cement blocks were made by the factories in this group.

Only 6 plants manufactured sand-lime brick in Canada in 1932; of these 3 were in Ontario, 2 in Quebec and 1 in Manitoba. Capital employed amounted to \$759,211, the number of workers was 75 and payment for salaries and wages aggregated \$74,521. Materials for manufacturing, chiefly sand and quick lime, cost \$49,106.

The 3 Ontario works, all in the vicinity of Toronto, accounted for 65 per cent of the production, 68 per cent of the employees, and 53 per cent of the capital.

Table 306.—Sand-Lime Brick Manufactured in Canada, by Provinces, 1930-1932

Province	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
	M	\$	M	\$	M	\$
Quebec.....	9,025	111,930	9,709	129,113	3,996	53,042
Ontario.....	41,576	424,178	34,400	313,189	6,823	78,398
Manitoba.....	1,720	23,730	1,226	17,457	*	*
Alberta.....						
British Columbia.....	449	7,184	668	10,024		
Total.....	52,770	567,022	46,003	469,783	10,819	131,440

*Included with Quebec.

SLATE

Slate deposits located along the south shore of the St. Lawrence river in Quebec, were operated for the first time in 1854. Production from these deposits reached a maximum in point of value in 1889 when 6,935 tons valued at \$119,160 were shipped. These shipments consisted of roofing slates, mantels and slabs. Quarrying operations were carried on at the Quebec deposits up to 1923, in which year 1,836 tons of crushed green and red slate were shipped for use in the manufacture of roofing material. No production from these deposits has been recorded since that date.

During 1908, a slate quarry was operated at Jarvis Inlet, British Columbia and during 1931 and 1932 a quarry at Leechtown, Victoria Mining Division, British Columbia, shipped crushed slate to companies manufacturing or selling roofing materials.

Table 307.—Production of Slate in Canada, 1922-1932

Year	Tons	Value	Year	Tons	Value
		\$			\$
1922.....	1,899	14,871	1930.....	150	3,000
1923.....	1,836	17,289	1931.....	250	5,000
1924-1929.....			1932.....	250	3,750

NOTE—For years 1886 to 1921 see previous reports.

Table 308.—Imports of Slate into Canada, 1930-1932

	1930		1931		1932	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Roofing.....Squares	4,349	59,411	3,777	42,523	1,521	11,819
School-writing.....		91,355		78,748		35,732
Pencils.....		6,506		2,932		2,810
Mantels and manufactures of slate, n.o.p.....		48,706		30,805		7,570
Total.....		205,978		155,008		57,931

THE STONE INDUSTRY IN CANADA

Including (1) The Stone Quarrying Industry and (2) the Monumental and Ornamental Stone Industry

(1) PRIMARY PRODUCTION—The Stone Quarrying Industry

Statistics of the stone industry as set forth in the general tables of this report have been confined to quarrying operations and to the production of dressed stone when this operation is carried on in conjunction with the quarrying. The kinds of stone quarried in Canada include granite (trap rock, syenite and other igneous rock), limestone, marble, sandstone, and slate. Stone of almost every known variety occurs in Canada; rocks of the igneous areas of British Columbia, Manitoba, Ontario, Quebec and the Maritime Provinces exhibit a wide range of physical characteristics, some varieties being especially noted for their richness of colour and beauty of crystallization. The sedimentary rocks including limestones, sandstones and marbles are widely distributed throughout Canada. The products from quarries operating in these formations not only yield high class structural and decorative materials but provide the chemical and other allied industries with many of their growing requirements.

Shipments of stone from Canadian quarries during 1932 amounted to 4,690,922 tons valued at \$4,938,461 as compared with 8,397,860 tons worth \$11,070,184 in 1931 and 9,994,506 tons at \$13,034,209 in 1930. Production during 1932 consisted of 490,822 tons of granite, 3,687,241 tons of limestone, 12,379 tons of marble and 500,480 tons of sandstone. In addition to these outputs 250 tons of slate were shipped from a property in British Columbia. Limestone, which constituted 79 per cent of the total quantity of stone produced, came from quarries operated in every province with the exception of Saskatchewan and Prince Edward Island. Mr. M. F. Goudge of the Mines Branch, Ottawa, in a report on "Canadian Limestones for Building Purposes" states that limestones are abundant throughout Canada but deposits which possess the many requirements demanded of stone for modern architectural purposes are not common. To be of value the deposits must be heavily bedded, free from close-spaced jointing and composed of stone which can be machined. It should possess a pleasing appearance and a high resistance to weathering agencies. The Canadian deposits now being worked for building stone are favourably situated with respect to centres of population and the supply of stone is adequate to meet the present demand and any future demand that can be foreseen; the stones being quarried are of various shades of grey and buff colour tones which are both popular and well suited to our northern latitudes. In their ability to retain their initial appearance the Canadian limestones rate high and compared to the well-known building limestones of other countries are relatively impervious; blocks of any superficial dimensions than can be transported can be obtained from the quarries, particularly from the Queenston and Tyndall areas, located in Ontario and Manitoba, respectively.

Some of the more important building limestones in Canada include those from the St. Marc des Carrières area in Quebec, the Queenston area in Ontario and the Tyndall area in Manitoba. Stone from all the quarries in the first named area is very similar in appearance and general properties. It is medium grained and on the natural fracture is light brownish grey in colour but

tooled and sawn surfaces are silvery grey. Blocks of very large superficial dimensions and three feet in thickness across the bedding are regularly obtainable. In the building trade the building stone from this area is known as Deschambault stone, St. Marc stone, and less commonly as Portneuf stone. Deschambault stone may be seen in the Parliament Buildings, Quebec; City Hall, Montreal; Prince of Wales College, Charlottetown, and various other important buildings.

Queenston limestone is widely used throughout Ontario and Quebec and has been shipped as far east as Saint John, New Brunswick. The staple variety is a compact, silver-grey magnesian limestone. A porous buff dolomite is obtainable in lesser quantity. The grey stone is quarriable in blocks of any reasonable dimensions as the jointing is very widely spaced. The products are mill blocks, sawn slabs, sawn strips, turned columns and flagging. The durability of Queenston limestone is illustrated by the good state of preservation of the structures composed of it; in addition to being used for the entire facing of buildings, Queenston silver-grey limestone, on account of its impermeability and its resistance to chipping, is used for base courses, steps, and platforms in buildings; the porous, buff stone is used only for interiors; this stone may be seen in Brock's Monument (1856) Queenston Heights, Ontario; East Block, Ontario Parliament Buildings, Toronto; the railway station, Saint John, New Brunswick, and many other well-known structures.

Limestone quarried in the vicinity of Tyndall, Manitoba, is variously known as Tyndall limestone, Manitoba limestone, Manitoba tapestry limestone and occasionally as Winnipeg limestone. Two varieties are available, a buff and a grey. The beds of buff range from 12 to 26 inches in thickness and the grey from 12 to 36 inches. Beds of buff up to 29 inches and of grey up to 40 inches thick can be obtained in which there are only minor parting planes of a stylolitic nature. Both buff and grey varieties are mottled exactly alike; they differ only in colour. The groundmass is dense, sub-crystalline calcium carbonate containing many fossil fragments composed of calcite, with an occasional one of silica. All through this matrix is a branching network of finely granular, magnesian material which composes the mottling. Tyndall stone has been used in the construction of many buildings throughout the Western Provinces and in Ontario and Quebec during the past thirty years and it has proved a very durable material. In addition to its use for exterior walls, Tyndall limestone finds wide use as an interior decorative stone. Some of the many prominent structures in which Tyndall limestone has been used are the Empress Hotel, Victoria, B.C.; Parliament Buildings, Winnipeg, Manitoba; and the Dominion Parliament Buildings, Ottawa.

It is interesting to note that crystalline limestone is being mined and milled in Pennsylvania. The mill products are used by rubber, paint, putty and linoleum manufacturers, and an admixture for concrete is also prepared. All the products are packed in bags for shipment.

Rock wool, one of the most effectual and satisfactory insulating materials on the market, is a furnace produce made from a self-fluxing silicious and argillaceous dolomite in which the acidic and basic constituents are present in such proportions that their fluxing action is nearly balanced. Its principal use is as an insulating material but it also forms the main ingredient in an acoustic tile. Laboratory investigations by the Mines Branch, Ottawa, indicate that dolomites and dolomitic shales occurring in the Niagara Peninsula are suitable for the manufacture of rock wool. Rock wool is sometimes sold in bulk but more often is processed in various ways and sold in "granulated" form, in "blankets" and when treated with a binder, in blocks and sheets under the name of rock cork.

Patents bearing on the utilization of dolomite have increased in number in recent years, both in the United States and other countries. These patents describe the production of refractories, magnesian cements, magnesium chemicals, and metallic magnesium, and indicate that dolomite, because of its widespread occurrence, must be considered an increasingly important competitor of magnesite.

Granite was produced in 1932 in all provinces with the exception of Prince Edward Island, Saskatchewan and Alberta. Numerous varieties of this rock, displaying a wide range of colours and crystallization, are to be found in different sections of the Dominion. In Nova Scotia during 1932 granite was quarried or dressed at Middleton, Queensport, Birchtown and Nictaux West; the Nova Scotia Department of Highways reported an output of crushed granite for use as road metal. The Nova Scotia granites as dressed in 1932 ranged in colour from light grey to black.

Granite was dressed or quarried in New Brunswick at Hampstead, South Bathurst, Bayside, and St. George. Stone was prepared for both building and monumental use, shades including red and black. The greater part of the Quebec granite produced for building and monumental purposes in 1932 came from quarries or dressing works operated in Labelle, Stanstead, Iberville, Frontenac, Compton and Lake St. John counties. Quebec granites are to be obtained in a variety of shades and textures and are utilized extensively for construction and monumental purposes throughout Canada. Examples of granite produced in the province of Quebec may be seen in the Sun Life Assurance Building, Montreal; National Research Laboratories, Ottawa; the Provincial Museum, Quebec city, and many other important and beautiful buildings.

In Ontario, granite for structural or decorative purposes is quarried at Peninsula, Butler and Parry Sound, and in addition considerable quantities of granite paving blocks are produced in the Gananoque area. Granite and trap rock for highway construction also constituted an important item in 1932. Granite occurrences are extensive in Ontario and the rock can be obtained in a variety of textures and colours.

The only recorded output of granite in Manitoba during 1932 came from Telford in the Hawk Lake district; this was grey in colour and was marketed for monumental purposes in Winnipeg. In British Columbia grey granite was quarried at Granite Island and Nelson; this was dressed for monumental purposes. Granite quarried on Nelson island was marketed in British Columbia, the Prairie Provinces and the United States. Large tonnages of granite were also used in British Columbia as rubble, riprap and road metal.

Marble quarried in 1932 at Philipsburg, Mississquoi county, Quebec, was marketed as dressed stone and in a variety of other forms for use as whiting, etc.; marble from this area has been used extensively for several years as a decorative and ornamental stone. In Ontario, buff, pink, brown and white marbles were quarried at Bancroft and sold as monumental or ornamental stone; marble was also produced during 1932 at Marblehead, British Columbia.

Sandstone for building purposes was quarried or dressed in 1932 at Wallace, Nova Scotia; Shediac and Sackville, New Brunswick; Ste. Foye, Quebec; near Acton, Limehouse, and Ottawa, Ontario; and Vancouver, British Columbia. The Wallace sandstone is classified as blue, dark olive, and light grey and is used principally for building purposes. The Nepean sandstone found near Ottawa, has been largely used for construction purposes, chiefly of the public buildings in that city, the more important of which include the Dominion Parliament Buildings, the Archives, and the Royal Canadian Mint.

Table 309.—Capital Employed in the Stone Quarrying Industry in Canada, by Provinces, 1931 and 1932

Province	1931					1932				
	Capital employed as represented by					Capital employed as represented by				
	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable etc.	Total	Cost of lands, buildings, machinery and tools	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital including cash, bills and accounts receivable etc.	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.	1,325,207	35,645	11,047	45,141	1,417,040	1,295,255	16,589	12,450	4,093	1,328,387
New Brunswick.	338,028	34,080	33,193	72,139	477,440	129,168	25,246	15,437	28,555	198,406
Quebec.....	4,994,935	407,495	238,845	1,165,574	6,806,849	4,635,435	313,053	189,032	824,637	5,962,157
Ontario.....	7,194,459	278,574	134,849	484,956	8,092,838	6,673,046	245,374	274,138	441,378	7,633,936
Manitoba....	481,262	56,862	23,105	210,410	771,639	452,069	44,584	1,212	93,385	591,250
Alberta.....	2,000				2,000					
British Columbia..	1,029,485	54,239	25,118	184,148	1,292,990	769,759	38,948	16,050	188,588	1,013,345
Canada..	15,365,376	866,895	466,157	2,162,365	18,860,796	13,954,732	683,794	508,319	1,580,636	16,727,481

Table 310.—Employees, Salaries and Wages in the Stone Industry in Canada, by Provinces, 1931 and 1932

Province	*Average number of employees			Salaries and Wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
1931						
Nova Scotia.....	10	131	141	15,126	118,646	133,772
New Brunswick.....	15	190	205	31,510	165,354	196,864
Quebec.....	165	2,310	2,475	282,057	2,184,221	2,466,278
Ontario.....	97	856	953	207,448	811,259	1,018,707
Manitoba.....	22	174	196	62,699	206,197	268,896
Alberta.....		2	2		2,576	2,576
British Columbia.....	20	206	226	61,039	322,567	383,606
Canada.....	329	3,869	4,198	659,879	3,810,820	4,470,699
1932						
Nova Scotia.....	6	51	57	7,565	32,977	40,542
New Brunswick.....	9	84	93	13,100	65,356	78,456
Quebec.....	116	1,352	1,468	184,082	896,090	1,080,172
Ontario.....	88	569	657	186,188	417,490	603,678
Manitoba.....	20	109	129	57,463	76,078	133,541
Alberta.....						
British Columbia.....	11	94	105	22,185	92,821	115,006
Canada.....	250	2,259	2,509	470,583	1,580,812	2,051,395

*See note page 36.

Table 311.—Production of Granite in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Tons	Value	Year	Tons	Value
		\$			\$
1923.....	398,432	1,159,303	1928.....	1,195,810	2,366,946
1924.....	419,971	1,013,345	1929.....	1,728,165	3,080,815
1925.....	971,718	2,014,535	1930.....	1,851,132	3,379,951
1926.....	1,064,423	1,574,627	1931.....	1,190,887	2,763,050
1927.....	730,049	1,383,557	1932.....	490,822	1,110,582

Table 312.—Production of Limestone and Sandstone in Canada, 1923-1932

(For the years 1886 to 1922 see Mineral Production of Canada, 1928)

Year	Limestone		Sandstone		Year	Limestone		Sandstone	
	Tons	Value	Tons	Value		Tons	Value	Tons	Value
		\$		\$			\$		\$
1923.....	3,687,663	4,475,921	22,766	66,547	1928.....	6,949,420	7,267,437	100,951	223,236
1924.....	4,249,061	4,831,684	94,603	240,273	1929.....	7,720,840	8,172,681	159,407	398,974
1925.....	4,643,853	5,049,563	87,502	145,757	1930.....	7,732,675	8,075,616	384,610	769,060
1926.....	5,283,745	5,657,328	44,127	112,347	1931.....	6,262,430	6,305,538	924,101	1,332,883
1927.....	6,438,379	7,145,917	132,799	232,793	1932.....	3,687,241	3,227,715	500,480	349,458

Table 313.—Production of Marble in Canada, 1923-1932

(For the years 1886 to 1922 see Annual Report Mineral Production of Canada, 1928)

Year	Tons	Value	Years	Tons	Value
		\$			\$
1923.....	2,473	201,518	1928.....	7,753	414,682
1924.....	4,379	322,455	1929.....	14,012	414,062
1925.....	3,046	254,922	1930.....	26,089	809,582
1926.....	5,295	521,572	1931.....	20,442	668,713
1927.....	5,209	503,037	1932.....	12,379	250,706

Table 314.—Production of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1931

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	2,033	98	15,890	35,090	8,877		1,700	63,688
..... \$	22,770	1,083	90,770	159,950	70,540		10,540	355,653
Dressed..... tons	40	2,844	40,462	4,999	7,603		9,709	65,657
..... \$	2,889	123,497	2,114,606	75,417	445,191		600,740	3,362,340
Monumental and ornamental—								
Rough..... tons	110	457	6,034	362			633	7,596
..... \$	1,200	5,557	56,665	12,181			9,328	84,931
Dressed..... tons	465	836	1,874	46		67	500	3,788
..... \$	19,360	112,528	92,879	2,232		3,800	30,680	261,479
Flagstone..... tons			359	559				918
..... \$			17,100	3,609				20,709
Curbstone..... tons		55	40,558					49,613
..... \$		1,013	186,418					187,431
Paving blocks..... tons			2,288	4,799			77	7,164
..... \$			15,550	41,332			1,565	58,447
Lining open-hearth furnaces..... tons					155			155
..... \$					271			271
Chemical—								
Flux in iron and steel plants.... tons	6,665		1,346	93,294	1,645	702		103,652
..... \$	7,364		1,674	62,571	2,770	1,264		75,643
Flux in smelters..... tons			2,230	36,367			31,950	70,547
..... \$			1,621	30,047			25,773	57,441
Glass factories..... tons						526		526
..... \$						790		790
Pulp and paper mills..... tons	4,559	19,865	45,089	34,528	8,478		17,928	130,447
..... \$	10,263	26,784	34,983	36,780	9,326		38,527	156,663
Sugar refineries..... tons		15		16,799	6,566	244		23,624
..... \$		120		11,759	7,588	439		19,906
Other chemical uses..... tons				4,903				4,903
..... \$				3,645				3,645
Whiting..... tons	118							118
..... \$	2,185							2,185
Asphalt filler..... tons			13,730	14,815				28,545
..... \$			41,885	33,308				75,193
Dusting coal mines..... tons	8,135					957		9,092
..... \$	40,675					3,349		44,024
Agricultural purposes..... tons	2,207	15,498	111,856	5,940	325		623	136,449
..... \$	8,928	46,494	99,240	8,733	404		1,486	165,285
Poultry grit..... tons				2,138			149	2,287
..... \$				7,712			959	8,671
Stucco dash..... tons			3,145	2,979			210	6,334
..... \$			17,680	12,495			2,508	32,683
Terrazzo flooring..... tons			384	75				459
..... \$			461	450				911
Rubble and riprap..... tons	22,694	22,657	313,275	43,558	5,110		233,743	641,037
..... \$	25,813	24,915	191,174	39,536	4,966		201,813	487,717
Concrete aggregate tons	11,875		2,423,172	89,179			1,050	3,275,276
..... \$	35,625		1,819,986	707,493			2,100	2,565,204
Crushed stone: Road metal..... tons	24,280		1,229,586	1,003,395	112,725		152,647	3,122,633
..... \$	48,560		1,096,895	1,183,250	99,343		129,467	2,557,515
Railroad ballast.. tons			14,251	615,539	1,764		20,798	652,352
..... \$			13,455	448,944	2,250		20,798	485,447
Total..... tons	83,181	62,325	4,265,529	3,359,364	153,248	2,496	471,717	8,397,860
..... \$	225,632	341,991	5,893,042	2,881,444	642,649	9,642	1,075,784	11,070,184
Per cent of total.....Quantity	1.0	1.0	51.0	40.0	2.0		5.0	100.0
.....Value	2.0	3.0	53.0	26.0	6.0		10.0	100.0

Table 315.—Production of Stone in Canada, by Provinces, Showing Purposes for Which Used, 1932

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	1,397	79	18,160	13,630	3,422			36,688
\$	9,784	565	38,781	78,588	13,711			141,429
Dressed..... tons	17	1,320	16,246	5,166	3,494		20	26,263
\$	805	28,400	561,962	88,410	213,585		980	894,142
Monumental and ornamental—								
Rough..... tons	275	268	3,623	696	18		517	5,397
\$	5,400	5,045	25,827	34,619	232		4,919	76,042
Dressed..... tons	143	601	1,166	44			734	2,688
\$	6,656	83,199	75,645	1,473			31,630	198,603
Flagstone..... tons			332	228				560
\$			2,282	540				2,822
Curbstone..... tons		68	5,677					5,745
\$		2,222	24,169					26,391
Paving blocks..... tons		84	1,905	260			12	2,261
\$		1,022	14,435	1,940			55	17,452
Lining open-hearth furnaces..... tons					173			173
\$					302			302
Chemical—								
Flux in iron and steel plants..... tons			1,513	49,660	1,290			52,463
\$			2,123	36,172	1,984			40,279
Flux in smelters..... tons				13,164			25,771	38,935
\$				9,345			20,835	30,180
Glass factories..... tons						958		958
\$						1,437		1,437
Pulp and paper mills..... tons	3,428		37,841	30,365	6,596		21,106	99,336
\$	6,845		33,726	25,289	7,195		20,393	93,448
Sugar refineries..... tons				19,503	8,077			27,580
\$				11,552	9,285			20,837
Other chemical uses..... tons			69	7,625				7,694
\$			374	2,265				2,639
Whiting..... tons	37		2,195					2,232
\$	681		1,756					2,437
Asphalt filler..... tons			14,481	5,832				20,313
\$			41,691	15,709				57,400
Dusting coal mines..... tons	2,369					430	30	2,829
\$	11,845					1,506	203	13,554
Agricultural purposes..... tons	1,581	9,864	51,791	4,440			248	67,924
\$	5,534	30,458	49,348	6,077			1,037	92,454
Poultry grit..... tons	1		47	2,531	514		69	3,162
\$	15		305	7,397	755		516	8,988
Stucco dash..... tons			1,635	725			109	2,469
\$			9,595	3,226			791	13,612
Terrazzo flooring..... tons			5,351	94				5,445
\$			7,208	564				7,772
Rubble and riprap..... tons	2,003	3,678	150,352	13,709	3,184		239,919	412,845
\$	2,992	2,911	89,060	10,948	2,204		208,238	316,335
Concrete aggregate..... tons	17,652	843	1,502,011	407,359	1,851	40		1,929,756
\$	28,080	1,096	1,002,853	285,958	2,059	42		1,320,088
Crushed stone—								
Road metal..... tons	5,758		405,923	1,282,001	49,804		103,885	1,847,371
\$	8,670		369,867	975,130	47,970		73,233	1,474,870
Railroad ballast..... tons			26,507	48,106			15,222	89,835
\$			9,894	59,814			15,222	84,930
Total..... tons	34,661	16,805	2,246,825	1,905,138	78,423	1,428	407,642	4,690,922
\$	87,307	154,918	2,360,901	1,655,016	299,282	2,985	378,052	4,938,461
Per cent of total..... Quantity	0-74	0-36	47-90	40-61	1-67	0-03	8-69	100-00
Value	1-77	3-14	47-81	33-51	6-06	0-06	7-65	100-00

NOTE.—In addition 250 tons of slate were produced in British Columbia.

Table 316.—*Production of Stone in Canada, by Kinds and by Provinces, 1931 and 1932

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
1931		\$		\$		\$		\$
Nova Scotia.....	24,895	72,009	21,684	69,415			36,602	84,208
New Brunswick.....	2,583	148,881	35,378	73,398			24,364	119,712
Quebec.....	727,354	1,987,589	2,675,186	2,774,060	14,919	624,356	848,070	507,037
Ontario.....	133,905	232,557	3,215,697	2,594,328	4,323	29,173	5,439	25,386
Manitoba.....			152,858	636,226	390	6,423		
Alberta.....			2,429	5,842			67	3,800
British Columbia.....	302,150	322,014	159,198	152,269	810	8,761	9,559	592,740
Canada.....	1,190,887	2,763,050	6,262,430	6,305,538	20,442	668,713	924,101	1,332,883
1932								
Nova Scotia.....	3,635	18,461	9,974	27,990			21,052	40,856
New Brunswick.....	4,369	102,699	10,707	31,554			1,729	20,065
Quebec.....	143,520	541,689	1,622,802	1,337,688	9,832	206,502	470,671	275,022
Ontario.....	73,272	186,357	1,825,793	1,419,049	2,065	40,175	4,008	9,435
Manitoba.....	18	232	78,405	299,050				
Alberta.....			1,428	2,985				
British Columbia.....	266,008	261,144	138,132	109,399	482	4,029	3,020	3,480
Canada.....	490,822	1,110,582	3,687,241	3,227,715	12,379	250,706	500,480	349,458

* For production of slate see Table 307.

Table 317.—*Production of Stone in Canada, by Kinds, Showing Purposes for Which Used, 1931 and 1932

Kind	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building—								
Rough.....1931	6,151	51,915	53,278	247,993	628	27,229	3,631	28,516
.....1932	6,131	17,272	25,073	104,391			5,484	19,766
Dressed.....1931	16,204	1,011,499	33,771	1,083,767	4,267	576,458	11,415	688,616
.....1932	12,469	336,632	11,173	348,187	1,951	188,743	670	20,580
Monumental and ornamental—								
Rough.....1931	5,820	58,142	1,020	9,590	756	17,199		
.....1932	4,423	39,522	9	106	965	36,414		
Dressed.....1931	3,479	251,379	242	6,300			67	3,800
.....1932	2,477	196,071	211	2,532				
Flagstone.....1931	314	16,797	95	483			509	3,429
.....1932	428	2,282	67	67			65	473
Curbstone.....1931	40,613	187,431						
.....1932	5,745	26,391						
Paving blocks.....1931	7,164	58,447						
.....1932	2,261	17,452						
Lining open-hearth furnaces.....1931			155	271				
.....1932			173	302				
Chemical—								
Flux in iron and steel plants.....1931			103,652	75,643				
.....1932			52,463	40,279				
Flux in smelters.....1931			70,547	57,441				
.....1932			38,935	30,180				
Glass factories.....1931			526	790				
.....1932			958	1,437				
Pulp and paper mills.....1931			124,347	151,600	6,100	5,063		
.....1932			97,623	92,027	1,713	1,421		
Sugar refineries.....1931			23,624	19,906				
.....1932			27,580	20,837				
Other chemical uses.....1931			4,903	3,645				
.....1932			7,694	2,639				
Whiting.....1931			118	2,185				
.....1932			37	681	2,195	1,750		
Asphalt filler.....1931			28,545	75,193				
.....1932			20,313	57,400				
Dusting coal mines.....1931			9,092	44,024				
.....1932			2,829	13,554				
Agricultural purposes.....1931			136,426	165,147	23	138		
.....1932			67,924	92,454				
Poultry grit.....1931	3	72	1,154	3,055	1,130	5,544		
.....1932	3	69	2,367	4,789	792	4,130		
Stucco dash.....1931			40	400	6,294	32,283		
.....1932			91	616	2,378	12,996		
Terrazzo flooring.....1931					459	911		
.....1932			4,745	3,084	700	4,688		
Rubble and riprap.....1931	262,525	226,066	324,793	190,503	185	288	53,534	70,860
.....1932	276,892	237,349	118,946	62,364	1,685	558	15,322	16,082
Crushed stone—								
Concrete aggregate.....1931	405,434	363,645	2,074,281	1,745,959			795,561	455,600
.....1932	30,419	25,134	1,450,927	1,049,395			448,410	245,559
Road metal.....1931	429,580	524,277	2,633,069	1,947,576	600	3,600	59,384	82,062
.....1932	149,574	212,408	1,667,268	1,215,464			30,529	46,998
Railroad ballast.....1931	13,600	13,380	638,752	472,067				
.....1932			89,835	84,930				
Total.....1931	1,190,887	2,763,050	6,262,430	6,305,535	20,442	668,713	924,101	1,332,883
.....1932	490,822	1,110,582	3,687,241	3,227,715	12,379	250,706	500,480	349,458

* For production of slate see Table 307.

Table 318.—Production in Canada, by Kinds and by Provinces, Imports and Exports of Stone, 1930-1932

	1930		1931		1932	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION, BY KINDS—						
Granite.....	1,851,132	3,379,951	1,190,887	2,763,050	490,822	1,110,582
Limestone.....	7,732,675	8,075,616	6,262,430	6,305,578	3,687,241	3,227,715
Marble.....	26,089	809,582	20,442	668,713	12,379	250,706
Sandstone.....	384,610	769,060	924,101	1,332,583	500,480	349,458
Slate.....	150	3,000	250	5,000	250	3,750
Total.....	9,994,656	13,037,209	8,398,110	11,075,184	4,691,172	4,942,211
PRODUCTION, BY PROVINCES—						
Nova Scotia.....	152,463	320,316	83,181	225,632	34,661	87,307
New Brunswick.....	111,612	284,869	62,325	341,991	16,805	154,918
Quebec.....	3,818,126	5,752,786	4,265,529	5,893,042	2,246,825	2,360,901
Ontario.....	5,396,233	4,850,528	3,359,364	2,881,444	1,905,138	1,655,016
Manitoba.....	147,078	1,085,479	153,248	642,649	78,422	299,282
Alberta.....	7,903	21,736	2,496	9,642	1,428	2,985
British Columbia.....	361,241	721,495	471,967	1,080,784	407,892	381,802
Canada.....	9,994,656	13,037,209	8,398,110	11,075,184	4,691,172	4,942,211
IMPORTS—						
Building stone, other than marble or granite, sawn on more than two sides, but not sawn on more than four sides.....	139	2,029	837	7,824	17	275
Building stone other than marble or granite, planed, turned, cut or further manufactured than sawn on four sides....	1,492	78,904	110	3,544	7	796
Flagstone, rough sandstone, and all building stone, not hammered, sawn or chiselled.....		309,930		150,593		32,887
Flagstone and building stone, other than marble or granite, sawn on not more than two sides.....		107,783		20,377		1,758
Granite, rough, not hammered or chiselled.....		78,233		50,599		48,351
Granite, sawn only.....		8,999		3,815		7,689
Granite, manufactures of, n.o.p.....		42,158		19,848		11,240
Granite monuments.....		132,622		94,806		68,466
Paving blocks.....		2,876		25		626
Marble, rough, not hammered or chiselled.....		243,621		90,526		18,648
Marble, sawn or sand rubbed, not polished.....		264,869		144,971		27,132
† Marble, manufactures of, n.o.p.....		170,001		103,528		43,044
Refuse stone.....	303,462	233,182	237,373	197,810	33,388	28,559
Slate, including roofing, pencils, writing, mantels, and manufactures n.o.p.....		205,978		155,008		57,931
Manufactures of stone, n.o.p.....		65,301		62,376		34,221
Total.....		1,946,486		1,195,650		381,623
EXPORTS—						
Crushed stone.....	136,837	235,406	74,244	135,140	43,993	80,451
Granite and marble, unwrought.....	1,768	21,913	2,938	52,058	2,133	41,172
Freestone, limestone, and other building stone, unwrought.....	2,149	15,829	305	2,087	20	100
Dressed stone.....		4,110		3,080		3,084
Total.....		277,258		192,365		124,807

† Includes marble, not further manufactured than sawn, when imported by manufacturers of tombstones to be used exclusively in the manufacture of such articles in their own factories.

(2) SECONDARY PRODUCTION—The Monumental and Ornamental Stone Industry

Production from stone dressing works operated separately from quarries was valued at \$2,961,914 in 1932 compared with a total of \$5,989,372 in 1931. This decline of 50 per cent, caused chiefly by unusual slackness in the building trades, brought the production value for this industry to the lowest point since records were commenced in 1919.

During 1932, a total of 206 establishments were engaged chiefly in cutting or dressing stone for building or monumental purposes. Of this total 109 were in Ontario, 42 in Quebec, 15 in Manitoba, 10 in British Columbia, 9 in Nova Scotia, 6 in New Brunswick, 8 in Saskatchewan, 5 in Alberta, and 2 in Prince Edward Island. These works employed an average of 1,003 persons throughout the year and produced monuments valued at \$1,388,258 and dressed building stone worth \$1,055,057. Monuments which were lettered only were valued at \$636,294.

Capital employed by the concerns in this industry was reported at \$5,828,109 of which \$3,254,354 was given as the value of plants and equipment, \$994,855 as inventories of materials on hand, \$372,219 as inventories of finished products on hand and \$1,206,681 as operating capital.

The cost of stone used in these plants was \$928,572 in 1932 and the cost of fuel and electricity was \$108,053.

Table 319.—Number of Plants, Employees and Value of Products of the Monumental and Ornamental Stone Industry in Canada, by Provinces, 1931 and 1932

Province	1931			1932		
	Number of plants	Number of employees	Selling value of products	Number of plants	Number of employees	Selling value of products
			\$			\$
Prince Edward Island and Nova Scotia.....	13	97	356,821	11	40	132,493
New Brunswick.....	8	28	78,458	6	24	51,343
Quebec.....	45	274	958,042	42	205	504,295
Ontario.....	118	807	3,853,865	109	576	1,881,313
Manitoba.....	14	81	239,976	15	54	143,612
Saskatchewan.....	8	37	118,100	8	33	70,756
Alberta.....	5	45	106,761	5	35	94,836
British Columbia.....	12	67	277,349	10	36	83,266
Canada.....	223	1,436	5,989,372	206	1,003	2,961,914

Table 320.—Products of the Monumental and Ornamental Stone Industry in Canada, 1931 and 1932

Item	1931	1932
	Total selling value at works	Total selling value at works
	\$	\$
Granite, cut and polished—(a) Monuments.....	1,584,099	1,164,283
(b) For building purposes.....	1,032,202	79,136
Marble, cut and polished—(a) Monuments.....	257,668	180,323
(b) For building purposes.....	1,054,952	339,627
Marble chips and dust.....	5,513	5,191
Limestone—(a) Monuments and bases.....	43,584	43,652
(b) For building purposes.....	1,372,121	636,294
Finished monuments, lettered only.....	613,593	487,286
Other products.....	25,640	26,122
Total.....	5,989,372	2,961,914

APPENDIX ONE

EXPLANATORY NOTES

Method of Computing Quantities and Values of the Mineral Production of Canada in 1931.

Arsenic.—White arsenic (As_2O_3) shipped from Canadian smelters at its sales value.

Bismuth.—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining at an arbitrary price; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

Cadmium.—Smelter production valued at the average London price for the year.

Cobalt.—Cobalt content of the various cobalt products sold by the Ontario smelter producing these products added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Copper.—(a) Recoverable copper in ores and concentrates exported valued at the average London price for the year, in Canadian funds; (b) Copper in blister copper made by British Columbia, Manitoba, Ontario and Quebec smelters valued at the average London price for the year in Canadian funds; (c) Copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary price agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

Gold.—Gold in bullion produced and the recoverable gold in all other Canadian mine products valued at the standard rate of \$20·671834 per fine ounce.

Lead.—(Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year in Canadian funds.

Nickel.—(a) Refined and electrolytic nickel produced at Canadian refineries valued in Canadian funds at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in Canadian funds in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte form).

Platinum Group Metals.—Recoverable metals in smelter products and placer platinum at the average London price and transposed to Canadian funds.

Silver.—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price for the refined metal in Canadian funds.

Zinc.—Refined zinc produced by the Consolidated Mining and Smelting Co. Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co. Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London in Canadian funds.

Coal.—Output tonnage evaluated pro rata according to income from sales.

Other Non-Metallic Minerals, Clay Products and Structural Materials.—Shipments during the year at their respective sales values.

Imports.—Statements of quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The price and value of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country the currency of which is not substantially depreciated.

Exports.—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

Weight.—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression ton means 2,000 pounds, and cwt. 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

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